Ontario

Ministry of
Transportation and
Communications

TRANSIT FARE INTEGRATION IN THE TORONTO AREA - PHASE II

Review of Existing Policies and Systems

Volume 1

MARCH 1985

IBI
GROUP

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

TRANSIT FARE INTEGRATION IN THE TORONTO AREA - PHASE II

REVIEW OF EXISTING POLICIES AND SYSTEMS
VOLUME 1

IBI GROUP
in Association with
J.W. Leas & Associates
and
Paterson Planning and Research Limited

March, 1985

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1. INTRODUCTION AND SUMMARY

This report describes the results of a comprehensive review of the existing policies and characteristics of the public transit systems, including GO Transit, in the Metropolitan Toronto Region. There are currently 16 municipal transit systems providing service in the study area which range from mature and well developed as in Metropolitan Toronto, to modest local systems providing relatively low levels of service.

Information for this part of the study was collected through personal interviews with transit managers and coordinators from: Hamilton, Burlington, Oakville, Mississauga, Brampton, Metro Toronto, Vaughan, Richmond Hill, Newmarket, Markham, Pickering, Ajax, Whitby, Oshawa and GO Transit (reference Appendix A for the persons contacted). Telephone contact was made with personnel responsible for public transit in Aurora and Milton. In addition to these interviews, data was collected from literature documenting local transit surveys, passenger counts and other transit service characteristics.

FARE COLLECTION EQUIPMENT INVENTORY

Four types of fare collection systems are currently in use within the study area:

- simple mechanical fareboxes which include a vault that locks when it is pulled from the farebox. Manufacturers include Duncan, Diamond, Cleveland and Grant;
- NCR electro-mechanical single ride ticket issuing machines which are found on GO Transit buses;
- token accepting turnstiles found in the TTC subway system;

- station attendants who sell fare media, collect prepaid fares and monitor pass use in GO Transit rail stations and the TTC subway system.

The major difficulties cited with the current equipment are the increasing volume of dollar bills being introduced into the fareboxes which cause jamming of the mechanical parts, and an increase in fraud due to the introduction of torn bills into the farebox. These problems are being dealt within a number of ways: the TTC is in the process of replacing a large number of their fareboxes with a more sophisticated mechanical farebox which will accept and display both the unfolded dollar bills and coins for viewing by the driver; others are considering electronic registering fareboxes which have a bill handling capability; several transit agencies are examining more attractive pricing of tickets to encourage off-board purchase of fare media.

Exact cash fares which are required on all transit systems have increased the potential for fraud since drivers cannot accurately monitor the amount of money deposited in coins in the farebox.

FARE PAYMENT POLICIES AND REGULATIONS

All of the transit properties in the study area use the same basic four fare categories: adult, senior citizen, student and child. In three of the properties there are also special categories for group travel. The adult category is the full fare category which is paid by riders not eligible for concessionary fares. Senior citizens are required to show identification to verify that they are 65 years of age or over. Identification is also required for those in the student category which is defined in most transit properties as including both elementary (over the age of 12 or 13 years of age) and secondary school students, except in Oakville and Brampton where students attending Sheridan College may also ride for the student fare. For both seniors and students, there is no universal ID that is valid on all transit services, since some transit systems require that the passenger be a resident of the municipality in order to benefit from the concessionary fares while other services will accept any official identification.

The definition of the child fare category is subject to the greatest variation of all fare categories:

- over half of the transit systems define a child as under 12 years of age;
- a few also use age as the definition with a child range from age 10 to age 16;
- the remainder define a child by height.

All municipalities have a policy that babies may ride free and over half of the municipalities allow pre-school (under 5) children who are accompanied by an adult to also ride free.

The TTC and the GO Transit systems have a group/family pass which may be used for unlimited travel on one day for up to five people. In Toronto it is valid on a Sunday or holiday, while on the GO system it is valid on any day. The family fare is also available in Newmarket for one parent and two or more children to take a trip together.

Other concessionary fares are available on municipal transit systems in the area. In most systems the blind are allowed to ride free, and in Hamilton a variety of concessionary fares are available which allow retired HSR employees, war amputees, regional police, those on a disabled pension, handicapped or unemployed to ride at a reduced fare.

There is a variety of fare media used in the transit properties including: single cash fare, single or books of multi-ride tickets, monthly and annual passes. In all municipalities, except GO Transit where only tickets and passes can be used, exact change is required on vehicles for cash fare payment and the driver will not provide change or sell tickets.

All municipal properties employ a single cash fare as their basic fare medium and in six properties this is the only fare medium. Single ride tickets are sold in Mississauga, the TTC and by GO Transit. Single fares for adults range from a high of 90¢ in Toronto to a low of 40¢ in Vaughan. The discount on single cash fares for senior citizens usually ranges between 45% and 60% except in a number of municipalities where the senior cash fare is the same as the adult cash fare, however discounts are provided to seniors in these municipalities for multi-ride or pass fare media. The child discounts on the single cash fare are usually similar to the seniors, while student discounts are usually somewhat less than or equal to those for seniors and children.

Nine transit properties including GO Transit sell multi-ride tickets in various denominations including packs of five, seven, ten or 22 tickets. The fare medium used for these multi-ride tickets are usually paper tickets except in Metropolitan Toronto where tokens are sold for use in turnstiles. The discount on these tickets in the adult fare category changes from 5% to 23%, reflecting the different discount philosophies: the use of multi-ride tickets as a convenience to the passenger (5% discount) and deliberate encouragement of the prepurchase of tickets to reduce on-board fare payment (23% discount).

Six properties sell monthly passes. There are a variety of graphic formats including two part passes with photographs (Mississauga and TTC) and single part passes which do not have a visual identification. Only Mississauga provides a pass in all concessionary fare categories. The number of break even rides for adults on the monthly pass based on the single cash fare ranges between 31 and 41 rides. Two municipalities, Mississauga and Hamilton, have an annual pass for senior citizens.

A detailed review of the fare structure in the municipalities in the study area shows that there is a wide variety of fare policies and regulations. The level of discount that is available for concessionary riders varies considerably between municipalities. Also, the discounts found on the multi-ride tickets and monthly passes follows a different pattern in each of the transit services.

Only Hamilton and TTC have explicit revenue/cost targets as a basis for establishing their fare policies. All transit properties explicitly recognize that there is a social objective in their fare structure in two respects; a general subsidy is provided to all uses, since farebox receipts, even from the highest paying passengers, do not cover operating costs, and additional special discounts are offered to concessionary passengers.

The predominant use of most transit systems is by adults with the except of Ajax, Burlington, Newmarket and Whitby where students are the largest group of users. The predominance of adult riders is a measure of the maturity of the transit system, with more mature systems tending to capture a larger share of adult riders.

The transit systems in the study area have different financial characteristics. The operating subsidy policy for the municipal transit program has set a target revenue/cost ratio based on municipal population. The provincial operating subsidy to a municipality is based on the actual revenue/cost ratio as compared with a target revenue cost ratio. Only three municipalities in the study area in 1983 achieved a revenue cost ratio equal to or above the target ratios set by the municipal subsidy program. This variable subsidy target and the variable financial performance of transit properties presents problems for any revenue and/or cost sharing arrangement which might be associated with fare integration. Under the present subsidy arrangements (and not considering the special subsidy arrangement for cross-boundary trips), if revenue from a cross-boundary or intermodal transit trip was split equally between the two adjacent municipal transit properties, one municipality may end up paying for a greater proportion of the total costs of the passenger trip than the other if their revenue/cost ratios were very different. While service and fare integration can be expected to increase transit patronage, initially the difference between the provincial subsidy levels for adjacent municipalities could pose a barrier to fare integration.

CONTROL PROCEDURES

All transit operators consider passenger fraud to be minimal with most indicating that it was less than 1% of fare revenue. Several identified students as the group which contributed to most of the fraud experienced in the exact cash fare systems. Many transit properties periodically retain a private security firm to investigate reported cases of passenger fraud. Employee fraud does not appear to be an issue of importance to most transit operators.

Passenger fraud through the misuse of monthly passes is controlled in the TTC and Mississauga Transit where a photo ID accompanies the pass. The other transit properties who issue monthly passes require only the signature of the bearer. The TTC is currently demonstrating a magnetic ticket/magnetic pass accepting turnstiles in a few of their stations on the Yonge subway line. GO Transit will be implementing a Proof Of Payment fare collection system on their Milton rail line in early 1985 which will involve on-board inspection on a random basis.

EVALUATION OF GO TRANSIT FARE INTEGRATION SCHEMES

Five of the 16 local transit properties have fare integration with the GO rail system. Full fare integration has been implemented in Brampton (1979), Burlington (1982), Oakville (1980), Pickering (1983), and Richmond Hill (fare integration but limited service integration). Mississauga (1981) has partial fare integration, in that only GO Transit passes with a Mississauga supplementary validation sticker are accepted for travel on Mississauga Transit routes to and from the GO rail stations. Except as noted for Mississauga, the systems accept all GO Transit pre-paid fare media and GO Transit transfers as valid fare payment and are repaid 75% of their adult single ride fare based on a monthly billing to GO Transit.

No specific studies have been undertaken to document the impacts of the GO Transit fare integration scheme. Interviews with GO Transit and managers of local transit systems and passengers surveys conducted in 1981 and in 1983 on the GO Transit rail system provided information to analyze the impacts of fare integration.

The participating municipal transit properties with full GO Transit fare integration have a very positive attitude about the scheme. In all cases they expressed that it has increased ridership and revenue with little or no increase in operating costs to carry the increased ridership, since most of the additional passengers had been accommodated on existing routes without additional buses. A review of GO transit ridership and egress modes in 1981 and 1983 showed that the implementation of full fare integration at GO Transit stations has resulted in significant increases in ridership on the local transit systems accessing the GO stations, but it has not apparently had a significant effect on GO Transit ridership.

EXISTING TRANSIT DEMAND

A preliminary analysis of the cross-boundary and intermodal transfers between transit services operating within the study area was prepared using data from surveys and counts undertaken by several transit agencies. Due to the variations in the types of data collected, the final data base of the cross-boundary and intermodal trips was not totally comprehensive. Since most cross-boundary trips take place across the Metro Toronto boundary, the analysis concentrated principally on these movements. Trips across the Metro Toronto boundary have increased substantially in the last four years and it can be expected that as Metro and the surrounding regions become increasingly interdependent, this trend will continue well into the future.

A TTC commuter survey which established that approximately 35% of the labour force living outside Metro commute into Metro for work. This survey also showed that work trips from municipalities adjacent to Metro Toronto are equally divided between adjacent Metro municipalities and downtown Toronto. However, trips from outside of Metro into the downtown area were found to have a much higher modal split than for trips into adjacent Metro areas. For example, work trips from the Southern York Region were found to have a 60% mode split into the CBD as opposed to a 9-12% modal split to areas in North York. Therefore, since the propensity for work trips to the adjacent Metro municipality and total CBD is the same, public transit provides for many more commuter work trips to the CBD of Toronto than for trips to the adjacent boroughs/cities of Metro. This is understandable in many respects, since the density of employment development in the central area of Toronto is much higher than in the suburban municipalities. However, it does indicate a need to improve service and fare integration between Metro and the municipalities adjacent to Metro if this increasingly important travel demand is to be accommodated on public transit to a greater extent in the future.

ANALYSIS OF FARE ADMINISTRATION COSTS

Most transit properties indicated that it was difficult to accurately segregate their costs associated with fare administration, since the revenue processing staff often had other responsibilities. They did however estimate the cost of fare administration as a percentage of total operating costs and it was found to range between .8% and 7%. GO Transit estimated that its fare administration costs represented approximately 17% of fare revenue.

MANAGER'S SURVEY

Most of the transit management staff interviewed identified some problems relating to service and fare integration. During the interviews with the transit managers, situations were identified where better fare or service integration would benefit passengers and/or the transit operations.

Several transit managers indicated that the potential financial impact of fare integration was a big issue, implying that significant losses of fare revenue as a result of fare integration could not be tolerated. Several transit managers also indicated a desire for fare integration with the GO Transit bus service, although they realized the problems with administration and control of such a scheme. Most managers indicated that the Ministry would have to play a prominent role in implementing fare integration because of the uncertainty surrounding its impact on local transit operations.

2. FARE COLLECTION SYSTEM CHARACTERISTICS

FARE COLLECTION EQUIPMENT INVENTORY

There are basically four types of fare collection system in current use within the study area:

1. Simple, mechanical fare boxes which include a vault that locks when it is pulled from the fare box. Manufacturers include Duncan, Diamond, Cleveland and Grant.
2. NCR electromechanical single ride ticket issuing machines which are found on GO Transit buses. These buses usually do not have a fare box and the money is retained by the driver.
3. Token accepting turnstiles found in the TTC subway system.
4. Station attendants who sell fare media; collect prepaid fares and monitor pass use in GO Transit rail stations and the TTC subway system.

Most transit operators commented on the difficulty that is caused by the increasing volume of dollar bills introduced into their fare boxes. This problem is most acute in those municipalities with adult single fares in excess of 75¢. Two problems were cited: jamming the mechanical parts of the fare box and fraud caused by the introduction of torn bills into the fare box. The TTC is in the process of replacing a large number of their fare boxes with a more sophisticated mechanical fare box which will accept and display both unfolded dollar bills and coins for viewing by the driver. Other operators are evaluating different solutions for this problem. Some are considering electronic registering fare boxes which have a bill handling capability and offer the prospect of passenger statistics. Oakville is examining more attractive pricing of tickets to encourage off-board purchase of fare media.

The introduction of a one dollar coin would alleviate this problem, particularly if the one dollar bills are removed from circulation, however unless the public need and support for the one dollar coin is positively demonstrated it is unlikely that the Canadian Mint will move to introduce a dollar coin in the near future. The Canadian Urban Transit Association, along with other associations interested in the dollar coin, may undertake a survey this fall to determine the public's perception of need.

Many transit operators interviewed indicated that they were concerned about the apparent increase in crime on board the buses and that while the drivers generally carried no cash, the fare box was a prime target. Increasing off-board ticket sales would alleviate this problem.

While exact cash fares have been a benefit to the driver, who is no longer required to carry and make change, they have introduced the potential for fraud, since drivers cannot accurately monitor the amount of money deposited in coins in the fare box.

FARE PAYMENT TRANSACTIONS POLICIES AND REGULATIONS

All of the seventeen transit properties (including GO Transit) in the study area use the same basic four fare categories: adult, senior citizen, student, and child. In three of the properties there are also special categories for group travel. Exhibit 2.1 summarizes the existing fare category definitions, the fare structure and the fare media used on transit systems operating within the study area.

Fare Categories

The following is a summary of the fare category characteristics across the study area:

- Adult - this is the full fare category which is paid by riders not eligible for a concessionary fare. In the study area the single cash fare in the municipalities

EXHIBIT 2.1

FARE STRUCTURE CHARACTERISTICS

(Effective: Summer 1983)

TRANSIT PROPERTY	AJAX	AURORA	BRAMPTON	BURLINGTON	GO†† (Minimum Fares)	HAMILTON	MARKHAM	MILTON	MISSISSAUGA
REDUCED FARE CATEGORIES:									
-Senior	Citizen with ID	Any ID	Citizen with ID	Any ID	Any ID	Ont. ID	Citizen with ID	Any ID	Citizen with ID
-Student †	Any E/S ID	Any E/S ID	Local E/S/C ID	Local E/S ID	Any E/S/C/U ID	Sec with HSR ID	Local E/S ID	Any E/S ID	Any E/S ID
-Child	under 13	under 12	under 16	under 12	under 12	<14 or <40" tall	under 12	-	-
-Free Child	< 5 with adult	babies	< 5 with adult	babies	< 5 with adult	< 5 with adult	babies	< 5 with adult	< 5 with adult
-Family	-	-	-	-	-	-	-	-	-
-Holiday/Group	-	-	-	-	Family all day	-	-	-	-
SINGLE CASH FARE ($)									
-Adult	0.50	0.50	0.75	0.70	1.50	0.85	0.75	0.55	0.85
-Senior	0.30	0.25	0.50	0.40	0.75	0.85	0.40	0.35	0.85
-Student	0.40	0.40	0.50	0.70	-	0.85	0.50	0.30	0.75
-Child	0.30	0.25	0.50	0.40	0.75	0.30	0.40	-	-
-Family	-	-	-	-	6.00	-	-	-	-
-Holiday	-	-	-	-	-	-	-	-	-
MONTHLY PASS ($)									
-Adult	-	-	-	-	47.00	30.00	-	-	33.00
-Senior	-	-	-	-	-	17.00#	-	-	-
-Student	-	-	-	-	28.00	17.00-28.00##	-	-	29.00
-Child	-	-	-	-	-	-	-	-	-
BOOK OF TICKETS ($)									
-Adult	-	-	10 for 7.00	10 for 6.50	10 for 13.50	10 for 7.50	-	-	10 for 8.00
-Senior	-	-	10 for 4.50	10 for 3.50	-	5 for 2.25	-	-	-
-Student	-	-	10 for 4.50	10 for 5.50	10 for 11.00	5 for 2.25	-	-	10 for 7.00
-Child	-	-	10 for 4.50	10 for 3.50	-	5 for 1.50	-	-	-
ANNUAL SENIORS PASS ($)	-	-	-	-	-	18.00 (over 70 years)	-	-	5.00

†E - Elementary School
S - Secondary School
C - College
U - University

††Adult Fare Formula: $0.42 + $0.06 per km
#Seniors age 65 - 70
##Lower Fare applies to Primary/Secondary Students
Higher Fare applies to Post Secondary Students

EXHIBIT 2.1
(Continued)

FARE STRUCTURE CHARACTERISTICS
(Effective: Summer 1983)

TRANSIT PROPERTY	NEWMARKET	OAKVILLE	OSHAWA	PICKERING	RICHMOND HILL	TORONTO	VAUGHAN	WHITBY
REDUCED FARE CATEGORIES:								
-Senior	Any ID	Any ID	Any ID	Any ID	Any ID	Citizen with ID	Citizen with ID	Any ID
-Student +	Any E/S ID	Local E/S/C ID	Local E/S ID	-	Any E/S ID	Local E/S ID	Local E/S ID	Local E/S ID
-Child	Uses a Seat	-	under 58"	under 12	under 12	under 13	Uses a Seat	under 12
-Free Child	babies	< 5 with adult	babies	babies	-	under 2	babies	< 5 with adult
-Family	adult & >1 child	-	-	-	-	-	-	-
-Holiday/Group	-	-	-	-	-	family all day	-	-
SINGLE CASH FARE ($)								
-Adult	0.60	0.75	0.65	0.75	0.65	0.90	0.40	0.55
-Senior	0.35	0.40	0.40	0.35	0.35	0.90	0.20	0.30
-Student	0.45	0.60	0.55	-	0.45	0.50	0.20	0.30
-Child	0.35	-	0.45	0.60	0.35	0.35	0.20	0.30
-Family	1.00		-	-	-	-	-	-
-Holiday	-		-	-	-	2.50	-	-
MONTHLY PASS ($)								
-Adult	-	-	24.00	-	-	36.50	-	20.00
-Senior	-	-	-	-	-	24.00	-	-
-Student	-	-	21.00	-	-	-	-	10.00
-Child	-	-	-	-	-	-	-	10.00
BOOK OF TICKETS ($)								
-Adult	22 for 12.00	10 for 6.75	-	10 for 7.00	-	7 for 4.90	-	-
-Senior	22 for 7.00	10 for 3.25	-	-	-	5 for 1.75	-	-
-Student	22 for 9.00	10 for 5.25	-	-	-	5 for 1.75	-	-
-Child	22 for 7.00	-	-	10 for 6.00	-	4 for .90	-	-
ANNUAL SENIORS PASS ($)	-	-	-	-	-	-	-	-

+E - Elementary School
S - Secondary School
C - College
U - University

ranges from 40¢ to 90¢ and the minimum adult single rail fare on GO Transit is $1.50 ($1.45 on the GO bus system);

- Senior Citizen - in all cases the senior citizen is required to show identification to verify that they are 65 years of age or over. In six of the municipalities (Metropolitan Toronto, Vaughan, Ajax, Brampton, Markham and Mississauga) it is required that the senior be a citizen of the municipality and hold a municipal identification card in order to benefit from the concessionary fare. In the remaining municipalities and GO Transit any type of identification which shows that the passenger is 65 years of age or over is accepted. The usual identification used in these instances is the Ontario Government senior citizen card.

  In all but three cases (Pickering, Toronto and Hamilton) the senior citizen fare is the same as the child fare. In Pickering there is no student fare, the child fare is higher than normal and the senior fare is the lowest. In Toronto, Hamilton and Mississauga there is no concessionary fare for seniors in the single cash fare category, however, in these municipalities there are substantial discounts for seniors multi-ride tickets or passes. In those municipalities which provide a concessionary single cash fares for seniors, the fare range is from 20¢ in Vaughan to 50¢ in Brampton.

- Students - the definition of a student in most transit properties includes both elementary (usually over 12 or 13 years of age) and secondary students. Proof of attendance in the form of a student ID card is required on paying a student fare. In nine of the municipalities the student is required to attend a local school in order to benefit from the student fares. In the remaining municipalities any ID which shows that they are attending elementary or secondary school is sufficient. Pickering is the only municipality with no student fare. In Oakville and Brampton students attending Sheridan College may also ride for the student fare; in Brampton the student fare is only available to college students during school hours. On the GO Transit system the student fares are only valid for trips to and from school determined by time of day. In most municipalities the student fare is greater than the child/seniors fare; in Vaughan and Whitby the student fare is the same as the child/seniors fare and in Milton the student fare is less than the seniors fare.

- Child - the definition of the child fare category is subject to the greatest variation of all fare categories. In seven of the transit systems (including GO Transit) the child fare category is defined as "under 12 years of age". Metro Toronto and Ajax define a child as "under 13". In Brampton the passenger may use a child fare if they are "under 16" and in Milton a child is defined as "under 10 years of age". In Vaughan and Newmarket if a young passenger is not a student but requires a seat they must pay the child fare. In Oshawa a child is defined as under 58 inches, while in Hamilton a child is either under 60 inches or under 14 years of age. In some municipalities the child and student categories overlap. Oakville, Milton and Mississauga do not have a child fare category since their student and pre-school categories cover the child age range. All municipalities have a policy that babies may ride free and in eight of the municipalities pre-school (under 5) children who are accompanied by an adult may also ride free. In this latter case if these children travel without an adult they are required to pay a child's fare.

- Other - on the TTC the GO systems there is a group/family pass which may be used for unlimited travel on one day for up to five people. In Metro Toronto it is only valid on a Sunday or holiday. On the GO system it is valid any day. In Newmarket there is a family fare which is valid for one parent and two or more children who take a trip together. On most services the blind are allowed to ride free. Hamilton has a variety of concessionary fares (see Appendix B) not found in other municipalities, including free travel for retired employees, war amputees and regional police. Hamilton also offers special rates for residents of the area who receive a disability pension, are handicapped or are unemployed. Passengers must use a special pass to benefit from these concessionary fares and the passes are acquired by completing an application swearing that they are eligible.

Fare Media

There is a variety of fare media used in the transit properties including: single cash fare, single or books of tickets, monthly and annual passes. In all municipalities, except GO Transit where only tickets and passes can be used, exact change is required on vehicles for cash fare payment and the driver will not provide change. The 17 properties utilize the following fare media as documented on Exhibit 2.1:

- all municipal properties employ a single cash fare as their basic fare medium; in six properties this is the only fare medium;
- single ride tickets are sold in Mississauga, the TTC (only on the subway system) and by GO Transit;
- in the six municipalities which have established fare integration with GO transit, GO fare media is accepted on local transit if the passenger is accessing a GO rail station;
- nine transit properties, including GO Transit, sell multi-ride ticket books in various denominations including packets of five, ten or twenty-two tickets (Newmarket). The discount on these tickets in the adult fare category ranges from 5% to 23% reflecting the different discount philosophies: the use of multi-ride tickets as a convenience to the passenger (5% discount) and deliberate encouragement of the pre-purchase of tickets to reduce on-board fare payment (23%);
- six properties have a monthly pass. There are a variety of graphic formats including two part passes with photograph (Mississauga and TTC) and single part passes which do not have visual identification. Only Mississauga provides a pass in all concessionary fare categories;
- tokens are sold by the TTC for use in turnstiles (although they are also accepted on surface vehicles), usually in bulk but they are also sold singly through vending machines;
- GO Transit sells a Mississauga sticker which endorses a valid GO Transit pass for use on Mississauga Transit routes accessing the GO rail stations;
- transfers are issued by all municipal transit properties, allowing a free transfer between vehicles in the same transit system. Transfers are issued by the GO Transit rail system providing a free transfer between GO rail and municipal transit properties which participate in fare integration. In most cases there are no free transfer privileges between interfacing municipal public transit systems, the exception is that Burlington Transit accepts transfers from passengers transfering from the Hamilton Street Railway;

- except for GO Transit bus services, tickets are not sold by the driver, they must be purchased at transit stations or independent ticket agencies.

Fare Structures

Exhibit 2.2 provides an analysis of the fare structure used by transit properties in the study area. Blank sections in the table mean that no fare exists in that category. Exhibit 2.2A shows the discount that the concessionary cash fare category represents as a per cent of the adult single cash fare. Exhibit 2.2B displays the following ratios for the multi-ride ticket: the ticket cost as a proportion of the single cash fare in that category and the ticket cost by category as a percentage of the adult single cash fare. For example, in Brampton the senior ticket rate is 90 percent of the senior single cash fare and 60 percent of the adult single cash fare. Information on monthly passes is shown on Exhibit 2.2C and provides the number of break even rides to justify the pass purchase, using the category cash fare, the category ticket cost and the adult cash fare as a base. This provides comparability between transit properties with different discount policies for concessionary fares. Following are the highlights from these exhibits presented by fare category:

- Adult - approximately half of the municipalities provide adult multi-ride ticket discounts. In all of these municipalities except Toronto the ticket cost is approximately 90 per cent of the adult single cash fare. In Toronto the ticket cost is 78 per cent of the single adult cash fare. On six transit properties: GO, Hamilton, Mississauga, Oshawa, Toronto and Whitby, there is a monthly pass available for adults which, when compared to the single ride fare, ranges from 31 break even rides on the GO system to 41 break even rides in Toronto. This comparison indicates that in Toronto it is financially more attractive to purchase tickets or tokens than a monthly pass unless use of the system exceeds 52 rides per month;

EXHIBIT 2.2A

FARE STRUCTURE COMPARISON - SINGLE CASH FARE
(Effective: Summer 1983)

TRANSIT PROPERTY	SINGLE CASH FARE BY CATEGORY As a % of Adult Single Cash Fare		
	Senior	Student	Child
AJAX	60.0	80.0	60.0
AURORA	50.0	80.0	50.0
BRAMPTON	66.7	66.7	66.7
BURLINGTON	57.1	100.0	57.1
GO*	50.0	100.0	50.0
HAMILTON	100.0	100.0	35.3
MARKHAM	53.3	66.7	53.3
MILTON	63.6	54.5	-
MISSISSAUGA	100.0	88.2	-
NEWMARKET	58.3	75.0	58.3
OAKVILLE	53.3	80.0	-
OSHAWA	61.5	84.6	69.2
PICKERING	46.7	-	80.0
RICHMOND HILL	53.8	61.5	53.8
TORONTO	100.0	55.6	38.9
VAUGHAN	50.0	50.0	50.0
WHITBY	54.5	54.5	54.5

* There is no cash fare for GO Transit; prices shown are for single ticket purchases.

EXHIBIT 2.2B

FARE STRUCTURE COMPARISON - MULTI-RIDE TICKETS

(Effective: Summer 1983)

TRANSIT PROPERTY	MULTI-RIDE TICKET COST							
	As a % of Category Single Cash Fare				As a % of Adult Single Cash Fare			
	Adult	Senior	Student	Child	Adult	Senior	Student	Child
AJAX	-	-	-	-	-	-	-	-
AURORA	-	-	-	-	-	-	-	-
BRAMPTON	93.3	90.0	90.0	90.0	93.3	60.0	60.0	60.0
BURLINGTON	92.9	87.5	78.6	87.5	92.9	50.0	78.6	50.0
GO	90.0	-	73.3	-	90.0	-	73.3	-
HAMILTON	88.2	52.9	52.9	100.0	88.2	52.9	52.9	35.3
MARKHAM	-	-	-	-	-	-	-	-
MILTON	-	-	-	-	-	-	-	-
MISSISSAUGA	94.1	-	93.3	-	94.1	-	82.4	-
NEWMARKET	90.8	90.9	90.9	90.9	90.8	53.0	68.2	53.0
OAKVILLE	90.0	81.3	87.5	-	90.0	43.3	70.0	-
OSHAWA	-	-	-	-	-	-	-	-
PICKERING	93.3	-	-	100.0	93.3	-	-	80.0
RICHMOND HILL	-	-	-	-	-	-	-	-
TORONTO	77.8	38.9	70.0	64.3	77.8	38.9	38.9	25.0
VAUGHAN	-	-	-	-	-	-	-	-
WHITBY	-	-	-	-	-	-	-	-

EXHIBIT 2.2C

FARE STRUCTURE COMPARISON - MONTHLY PASS

(Effective: Summer 1983)

TRANSIT PROPERTY	MONTHLY PASS - BREAKEVEN RIDES											
	BASED ON CATEGORY CASH FARE				BASED ON CATEGORY MULTI-RIDE TICKET COST				BASED ON ADULT CASH FARE			
	Adult	Senior	Student	Child	Adult	Senior	Student	Child	Adult	Senior	Student	Child
AJAX	-	-	-	-	-	-	-	-	-	-	-	-
AURORA	-	-	-	-	-	-	-	-	-	-	-	-
BRAMPTON	-	-	-	-	-	-	-	-	-	-	-	-
BURLINGTON	-	-	-	-	-	-	-	-	-	-	-	-
GO	31	-	19	-	35	-	25	-	31	-	19	-
HAMILTON	35	1.8#-20	20u-33c	-	40	3.3#-38	38u-42c	-	35	1.8#-20	20u-33c	-
MARKHAM	-	-	-	-	-	-	-	-	-	-	-	-
MILTON	-	-	-	-	-	-	-	-	-	-	-	-
MISSISSAUGA	39	0.5#	39	-	41	0.5#	41	-	39	0.5#	34	-
NEWMARKET	-	-	-	-	-	-	-	-	-	-	-	-
OAKVILLE	-	-	-	-	-	-	-	-	-	-	-	-
OSHAWA	37	-	38	-	†	†	†	†	37	-	32	-
PICKERING	-	-	-	-	-	-	-	-	-	-	-	-
RICHMOND HILL	-	-	-	-	-	-	-	-	-	-	-	-
TORONTO	41	27	-	-	52	69		-	41	27	-	-
VAUGHAN	-	-	-	-	-	-	-	-	-	-	-	-
WHITBY	36	-	33	33	†	†	†	†	36	-	18	18

# Annual Pass - shows Breakeven Rides per Month
† Multi-Ride Tickets Not Available
c College Pass Rate

u University Pass Rate

- Senior Citizen - with the exception of Hamilton/ Wentworth, Mississauga and the TTC senior citizen cash fares range from 45 to 60% of the adult cash fare. For those three municipalities concessionary fares are available for ticket purchasers only in Hamilton and Toronto and for purchasers of an annual pass within Mississauga with the exception of Toronto and Hamilton ticket cost is 80 to 90% of the single senior cash fare.

  Passes either monthly or annual are provided on the Hamilton, Toronto, Whitby and Mississauga services.

  The fare structure for senior citizens produces a strong incentive for residents of Mississauga and Hamilton/Wentworth (over 70) to use annual passes likewise the discount for tickets within Metropolitan Toronto and Hamilton (under 70) makes ticket use very attractive. In the other municipalities and GO transit the single fare, either cash or ticket, is the most attractive.

- Student - in municipalities which provide concessionary single cash fares for students the fares range from 50 to 80 per cent of the adult single cash fare. Burlington, Hamilton and GO Transit do not provide a concessionary single student fare, but their multi-ride tickets provide discounts similar to the single fare discounts in other municipalities. Eight transit properties provide multi-ride tickets for students, but the discount in three of these (Brampton, Mississauga, and Newmarket) is unlikely to attract their purchase, except as a convenience. Students may purchase passes on the Mississauga, Oshawa, Whitby, Hamilton and GO Transit systems. The number of break even rides for student passes is somewhat less than for adults, ranging from 19 to 38 rides based on the student cash fare. Hamilton has two categories of student pass, elementary/secondary and post-secondary; with break even rides of 20 and 33 respectively. Only Pickering has no student concessionary fare.

- Child - the child single cash fare usual falls between 50 and 66 per cent of the adult single cash fare. In both Toronto and Hamilton it is much lower at 35 to 39 per cent. In Pickering the cash fare for children is approximately 80 per cent of the adult single cash fare. Six municipalities provide multi-ride tickets for children at a cost of 88 to 100 per cent of the

> child single cash fare. The exception is Toronto where the concessions to children are very large with the ticket cost at 64 per cent of the child cash fare or 25 per cent of the adult single cash fare. Only Whitby provides a pass for children which, compared to the child cash fare requires 33 rides to break even. Considering the most attractive fare options, the discounts for child fares follow a similar pattern to those of seniors, with a 40-60 percent discount on the adult cash fare. Exceptions to this apply in Toronto, Hamilton and Pickering which have minimum child fares of 25, 35 and 80 percent of the adult cash fare respectively.

As the above analysis indicates, there is a wide variety of fare policies and regulations throughout the study area. To remove some of the confusion associated with trying to interpret these policies, Exhibit 2.3 provides a comparison of actual fares for casual and frequent transit users in the adult, senior, student and child fare categories. The casual transit user would have a choice between cash fare and, where available, multi-ride tickets. The lowest cost option of these two is presented in the table. The frequent user would have a choice between either multi-ride tickets, or a monthly pass subject to availability. The monthly pass rate used for this comparison assumes 40 rides per month. Six transit properties have cash only fares and therefore the fares shown for these transit properties are the same for casual and frequent users.

This exhibit shows considerable variation between municipalities for individual fare categories, although there appears to be a pattern with the lower priced fare associated with smaller municipalities such as Ajax, Aurora, Milton, Newmarket, Vaughan and Whitby. Obviously, any attempt to standardize the fares across the municipalities would at this time represent a substantial problem.

In addition to the standard fare categories, there are a variety of historic special discount given to the disabled, system employees, post office employees, police, the unemployed and other special categories of

EXHIBIT 2.3

COMPARISON OF FARES FOR CASUAL AND FREQUENT TRANSIT USERS

(Effective: Summer 1983)

TRANSIT PROPERTY	AJAX	AURORA	BRAMPTON	BURLINGTON	GO (Minimum Fare.)	HAMILTON	MARKHAM	MILTON	MISSISSAUGA**
CASUAL USERS									
-ADULT	0.50	0.50	0.70	0.65	1.35	0.75	0.75	0.55	0.80
-SENIOR	0.30	0.25	0.45	0.35	0.75	0.45	0.40	0.35	0.05
-STUDENT	0.40	0.40	0.45	0.55	1.10	0.45	0.50	0.30	0.70
-CHILD	0.30	0.25	0.45	0.35	0.75	0.30	0.40	-	-
REGULAR USERS*									
-ADULT	0.50	0.50	0.70	0.65	1.18	0.75	0.75	0.55	0.80
-SENIOR	0.30	0.25	0.45	0.35	0.75	0.43	0.40	0.35	0.01
-STUDENT	0.40	0.40	0.45	0.55	0.70	0.43	0.50	0.30	0.70
-CHILD	0.30	0.25	0.45	0.35	0.75	0.30	0.40	-	-

TRANSIT PROPERTY	NEWMARKET	OAKVILLE	OSHAWA	PICKERING	RICHMOND HILL	TORONTO	VAUGHAN	WHITBY
CASUAL USERS								
-ADULT	0.55	0.68	0.65	0.70	0.65	0.70	0.40	0.55
-SENIOR	0.32	0.33	0.40	0.35	0.35	0.35	0.20	0.30
-STUDENT	0.41	0.53	0.55	-	0.45	0.35	0.20	0.30
-CHILD	0.32	-	0.45	0.60	0.35	0.23	0.20	0.30
REGULAR USERS*								
-ADULT	0.55	0.68	0.60	0.70	0.65	0.70	0.40	0.50
-SENIOR	0.32	0.33	0.40	0.35	0.35	0.35	0.20	0.30
-STUDENT	0.41	0.53	0.53	-	0.45	0.35	0.20	0.25
-CHILD	0.32	-	0.45	0.60	0.35	0.23	0.20	0.25

*Assumes 40 trips per month for pass users.

**Senior Fares for Casual riders based on one round trip per week

Senior Fares for Regular riders based on forty trips per month.

user which varies from municipality to municipality. The proliferation of identification cards to qualify for discount fares makes the administration of the fare collection system both awkward and complex. All of these problems will need to be dealt with in some way if an improved level of fare integration between municipal transit properties is to be achieved.

Exhibit 2.4 provides a profile of transit system use by the four principal fare categories for those transit properties in the study area where the data was available. Adults provide the predominant use of most transit systems, with the exception of Ajax, Burlington, Newmarket and Whitby where students are the largest group of users. This can be considered a measure of the maturity of the transit systems, with more mature systems tending to capture a larger share of adult riders.

Only Hamilton and TTC have explicit revenue/cost targets as a basis for establishing their fare policies. All transit properties explicitly recognize that there is a social objective in their fare structure in two respects; a general subsidy is provided to all users, since fare box receipts, even from the highest paying passengers, do not cover operating costs, and additional special discounts are offered to concessionary passengers. As noted above, each transit property has its own policies in this regard.

Financial Characteristics

Exhibit 2.5 provides some characteristics of the transit properties including population, annual passenger trips, passenger trips per capita, passengers per revenue vehicle kilometre, revenue cost ratio for the last 5 years and the target revenue over cost ratio. The operating subsidy policy for the municipal transit program has set a target revenue cost ratio based on municipal population. The provincial subsidy to the municipality is based on their actual revenue cost ratio as compared with the target revenue cost ratio.If the actual ratio is equal to or above the target ratio the basic subsidy is 50% of their theoretical net cost; if it is below, the municipality receives 50% of their theoretical net cost and

EXHIBIT 2.4

1983 ANNUAL PASSENGER USE BY FARE CATEGORY

TRANSIT PROPERTY	ADULT		SENIOR CITIZEN		STUDENT		CHILD		TOTAL ANNUAL PASSENGERS
	Total	%	Total	%	Total	%	Total	%	
AJAX	95,247	38	30,078	12	100,260	40	25,065	10	250,650
BRAMPTON*	2,188,404	52	126,254	3	946,906	22	946,906	22	4,208,469
BURLINGTON	552,743	25	221,097	10	1,216,034	55	221,097	10	2,210,971
HAMILTON	14,891,410	58	4,544,448	18	5,134,969	20	1,078,343	4	25,674,845
MARKHAM	842,382	53	270,198	17	381,456	24	95,364	6	1,589,400
MISSISSAUGA	7,352,156	57	1,031,882	8	4,514,482	35	-		12,898,520
NEWMARKET	123,582	33	67,408	18	149,796	40	33,704	9	374,490
OAKVILLE	1,211,662	54	44,876	2	987,280	44	-		2,243,818
OSHAWA	1,609,239	45	281,565	8	1,546,463	43	134,951	4	3,572,218
RICHMOND HILL	254,820	60	21,235	5	127,410	30	21,235	5	424,700
TORONTO	309,548,000	76	24,438,000	6	57,022,000	14	16,292,000	4	407,300,000
VAUGHAN	721,300	83	7,900	1	119,800	14	18,000	2	867,000
WHITBY	71,680	28	20,480	8	153,600	60	10,240	4	256,000
AVERAGE		51		9		36		4	

*Since the split between child and student rides unknown;assumed to be 50:50.

EXHIBIT 2.5

1983 PASSENGER AND REVENUE/COST CHARACTERISTICS

TRANSIT PROPERTY	POPULATION	Annual PASSENGER TRIPS	PASSENGERS/ CAPITA	PASSENGERS/ REV VEH KM	REVENUE COST RATIO (%)					
					1979	1980	1981	1982	1983	TARGET
AJAX	23,700	250,650	10.6	1.82	54	53	51	46	50	50
AURORA	16466	278150	16.9	2.02	31	27	24	22	50	50
BRAMPTON	161,000	4,208,469	26.1	1.41	40	48	48	49	54	60
BURLINGTON	113,300	2,210,971	19.5	1.08	48	52	46	45	48	55
HAMILTON	415,000	25,674,845	61.9	1.75	50	50	50	48	46	65
MARKHAM	92,000	1,589,400	17.3	1.20	36	43	44	37	39	50
MILTON	29,500	142,430	4.8	0.27	41	29	23	24	22	50
MISSISSAUGA	337,170	12,898,520	38.3	1.46	49	54	56	60	56	65
NEWMARKET	30,953	374,490	12.1	1.42	34	31	29	32	34	50
OAKVILLE	76,720	2,243,818	29.2	1.74	42	47	46	52	49	50
OSHAWA	119,722	3,572,218	29.8	1.85	53	52	61	64	64	55
PICKERING	36,500	380,357	10.4	0.59	39	37	31	22	30	50
RICHMOND HILL	38,488	424,708	11.0	1.72	34	33	40	43	32	50
TORONTO	2,140,347	407,300,000	190.3	2.24	78	74	74	70	67	73
VAUGHAN	30,000	867,000	28.9	1.66	51	40	30	35	44	50
WHITBY	40,000	256,000	6.4	1.15	-	12	18	18	19	50

25% on the remainder of their net cost to a limiting value, below which they receive no additional subsidy. Three municipalities in the study area in 1983 achieved a revenue cost ratio equal to or above the target ratio set by the municipal subsidy program. Therefore in most cases the municipalities in the study area receive less than 50% of their actual net costs.

This variable subsidy target and the variable financial performance of transit properties presents problems for any revenue and/or cost sharing arrangement which might be associated with fare integration. Setting aside the special cross-boundary subsidy and dealing only with the current municipal operating subsidy policy, if revenue from a cross-boundary or inter-modal transit trip were split equally between the two affected municipal transit properties, one municipality would end up paying for a greater proportion of the total cost of the passenger trip than the other. For example, considering trips between Whitby and Oshawa, and using the 1983 revenue/cost performance ratios, Oshawa would pick up approximately 38% of the difference between passenger revenue and cost for the trip from local tax revenues, whereas Whitby would have to cover approximately 65% of the deficit related to an intermodal trip. While service and fare integration can be expected to increase transit patronage, initially this difference between provincial subsidy levels for adjacent municipalities could pose a barrier to fare integration.

Off-board ticket media sales are offered in a variety of ways. The TTC has an extensive network of agents who earn a commission on ticket and pass sales. Tickets are also sold through subway station attendants in the subways and roving ticket sales persons in high traffic areas. GO Transit sell tickets and passes at bus and rail stations as well as through a network of ticket agencies. In other communities, tickets and passes are usually available at a few community outlets, banks, municipal buildings and variety stores, often without a commission to the seller.

Most transit agencies carry out their own revenue processing, including the separation of ticket media from cash, sortation, counting and banking. Smaller municipalities such as Ajax and Vaughan contract with third parties (such as the local bank or Brinks) to do the revenue processing and some others do it through their parking authority. Municipal transit systems which participate in GO Transit fare integration separate and count the GO Transit fare media received on their vehicles.

CONTROL PROCEDURES

All transit operators consider passenger fraud to be minimal (most indicated that it was less than 1% of fare revenue). Several identified students as a group which contributed to most of the fraud experienced in the exact cash fare systems. Many transit properties periodically retain a private security firm to investigate reported cases of passenger fraud.

Employee fraud does not appear to be an issue of importance to most transit operators. Revenue processing personnel are usually subject to the periodic scrutiny of inspectors or other supervisory staff, either directly or through remote video surveillance.

Passenger fraud through the misuse of monthly passes is controlled in the TTC and Mississauga Transit through the use of a photo I.D. accompanying the pass which is inspected together with the pass by transit personnel. The other transit operators who issue monthly passes require only the signature of the bearer.

The TTC is currently demonstrating magnetic ticket/magnetic pass accepting turnstiles in a few of their stations on the Yonge subway line. Software in the turnstile control system prevents the pass-back and reuse of the magnetically encoded passes. When a passenger uses a magnetically encoded pass, the information on the pass is recorded in the system and the pass is rendered invalid for a 15 minute period at the same station.

GO Transit will be implementing a proof-of-payment fare collection system on their Milton rail line in early 1985. This will involve on-board inspection on a random basis. Depending upon the frequency of inspections, this method has been successful in restricting fraud to less than 5% of passenger revenue.

ANALYSIS OF FARE ADMINISTRATION COSTS

Most transit properties have indicated that it was difficult to accurately segregate their costs associated with fare administration, since the revenue processing staff often had other responsibilities. The following list shows the estimated costs of fare administration as a percentage of total operating costs for those municipalities from which information was obtained:

Municipality	Fare Administration Costs as a % of Operating Costs
Ajax	0.8%
Brampton	0.9%
Hamilton	2.4%
Markham	0.7%
Mississauga	1.0%
Oakville	0.8%
Oshawa	1.0%
Pickering	2.0%
Richmond Hill	7.0%

GO Transit has estimated that its fare administration costs represent approximately 17% of fare revenue. This reflects the relatively labour-intensive fare collection system employed in GO Transit rail stations.

3. EVALUATION OF GO TRANSIT FARE INTEGRATION SCHEMES

Five of the sixteen local transit properties have fare integration with the GO Rail system; full fare integration has been implemented in Brampton (1979), Burlington (1982), Oakville (1980), Pickering (1983), and Richmond Hill (fare integration but limited service integration). Mississauga (1981) has partial fare integration, in that only GO Transit passes with a Mississauga supplemental validation sticker are accepted for travel on Mississauga Transit routes to and from the GO rail stations. The other systems accept all GO Transit pre-paid fare media and GO Transit transfers as valid fare payment and are repaid 75% of their adult single ride fare based on a monthly billing to GO Transit.

In addition to the above schemes, GO Transit provides some local transit services under special agreements with the the participating municipalities, as follows:

- the Town of Ajax sells GO Transit passes for travel within the Town on GO Transit services at a reduced rate compared with the price they pay GO Transit for the passes;
- GO Transit provides a local transit service on Yonge Street connecting Richmond Hill with the Yonge subway at Finch. This service was instituted to reduce the duplication of service being provided in this corridor between GO Transit and the TTC which was operating a service on North Yonge under contract to the municipalities;
- GO Transit provides local service on Lakeshore Road within Burlington, charging passengers according to the local transit fare schedule. In turn, GO Transit invoices the City of Burlington for the difference between their minimum bus fare ($1.45) and the cash receipts from local passengers plus a monthly service charge.

No specific studies have been undertaken to document the impacts of GO Transit fare integration schemes. The following analysis of impacts is based on:

- interviews with GO Transit and managers of local transit systems participating in the GO Transit fare integration schemes;
- information on passenger ridership characteristics obtained from the above agencies;
- passenger surveys conducted in 1981 and 1983 on the GO Transit rail system;
- ticket and pass sales data by corridor on the GO rail system.

All of the participating municipal transit properties (Brampton, Oakville, Burlington and Pickering) with full GO Transit fare integration expressed a very positive attitude toward the scheme was expressed. In all cases, it has increased ridership and revenue. While the revenue per passenger has decreased, the significant increase in ridership has produced very large increases in total revenue in the affected municipal transit properties. In all cases there has been little or no increase in operating costs to carry this increased ridership, since most of the additional passengers have been accommodated on existing routes without additional buses.

It is quite likely that GO Transit fare integration will be extended to other municipalities where local transit service to GO Rail stations is either now provided or is possible in the future. Also the possibility of extending the fare integration scheme to include the interface between local transit and the GO bus system is being considered by GO Transit, although this would be more difficult to control since there would likely be a larger number of bus/bus interfaces meaning that the local bus operators would have greater difficulty in detecting the fraudulent use of GO Transit passes for local transit trips.

In 1981 and 1983 GO Transit carried out surveys of passengers using the GO Rail system. These surveys were self-administered and copies of the survey forms are provided in Appendix C. Special cross-tabulations of information from the 1983 survey were prepared for this study by the MTC to illustrate the characteristics of passengers at selected stations including those with full local transit fare integration, partial and no fare integration. Exhibit 3.1 provides a comparison of the results of the 1981 and 1983 surveys for the nine selected stations.

The impact of fare integration on local bus access to those stations with full fare integration is evident from this exhibit. Brampton, Pickering and Oakville all experienced major increases in the proportion of passengers egressing the stations by local bus between 1981 and 1983. In Brampton, the local bus increase was taken primarily from the passenger pickup mode, with the proportion by parked car mode decreasing only 2% over the period. In Pickering the results of the surveys are somewhat anomolous. The substantial decrease in the "other GO" mode from 1981 to 1983 cannot be explained by the increase in the local bus share, since the majority of GO bus passengers egressing the stations are destined for Ajax, Whitby and Oshawa. However some of the increase in local Pickering Transit ridership was probably diverted from GO buses which used to operate locally within Pickering. The increase in the proportion of cars parked is the result of a major parking lot expansion during the period. In Oakville, the increase in local bus share appears to have come predominantly from a decrease in the proportion who park their cars and in the other GO bus service modes.

At those stations where there is partial fare/service integration, changes in modal shares between 1981 and 1983 were significantly less dramatic. An increase in the local bus share at Port Credit, coming primarily from a reduction in the proportion of car parkers, could be attributable to the partial fare integration. The results in Malton are based on too few survey responses to be reliable.

EXHIBIT 3.1

COMPARISON OF 1981 AND 1983 GO TRANSIT PASSENGER SURVEY RESULTS FOR SELECTED STATIONS

1981 GO TRANSIT SURVEY

	EGRESS MODE STATION %	WALK	LOCAL BUS	TAXI	OTHER GO	DRIVER- PARKED CAR	PASSENGER PARKED CAR	PICKUP
FULL FARE INTEGRATION	BRAMPTON	9.0	20.3	0.2	5.9	40.9	3.3	20.3
	PICKERING	8.2	6.9	0.9	38.8	33.3	2.4	9.5
	OAKVILLE	4.5	28.8	0.2	14.4	41.2	2.9	8.0
	TOTAL	6.6	17.6	0.6	25.6	37.4	2.7	9.6
PARTIAL FARE AND/ OR SERVICE INTEGRATION	RICHMOND HILL	15.9	0.9	5.3	2.7	56.6	2.7	15.9
	PORT CREDIT	35.4	10.2	0.0	0.3	38.8	2.1	13.1
	HALTON	9.6	3.2	0.0	0.0	53.2	4.3	29.8
	MEADOWVALE	No Service						
	TOTAL	31.8	8.8	0.5	0.5	41.5	2.3	14.6
NO INTEGRATION	SCARBOROUGH	17.0	0.9	0.0	0.0	64.8	3.9	13.5
	GUILDWOOD	20.2	1.7	0.9	0.0	57.3	1.9	18.0
	TOTAL	19.3	1.5	0.6	0.0	59.5	2.5	16.6

1983 GO TRANSIT SURVEY

	EGRESS MODE STATION %	WALK	LOCAL BUS	TAXI	OTHER GO	DRIVER- PARKED CAR	PASSENGER PARKED CAR	PICKUP
FULL FARE INTEGRATION	BRAMPTON	10.4	29.7	0.5	3.0	38.8	3.1	14.5
	PICKERING	6.4	21.7	1.3	15.5	42.4	3.5	9.1
	OAKVILLE	5.3	41.5	0.6	6.1	36.7	1.9	7.9
	TOTAL	6.3	30.7	1.0	10.5	39.7	2.8	9.1
PARTIAL FARE AND/ OR SERVICE INTEGRATION	RICHMOND HILL	17.3	2.8	1.1	0.1	58.4	3.2	17.3
	PORT CREDIT	33.1	15.8	0.5	1.3	34.2	2.2	12.9
	HALTON	8.7	2.9	0.0	1.2	54.1	5.2	27.9
	MEADOWVALE	11.1	13.6	0.9	2.3	41.1	3.0	28.0
	TOTAL	27.4	13.6	0.6	2.1	37.6	2.6	16.2
NO INTEGRATION	SCARBOROUGH	13.4	2.3	0.5	0.5	61.2	6.3	15.9
	GUILDWOOD	17.9	3.9	0.3	0.9	55.4	2.2	19.5
	TOTAL	16.6	3.4	0.4	0.8	57.0	3.3	18.5

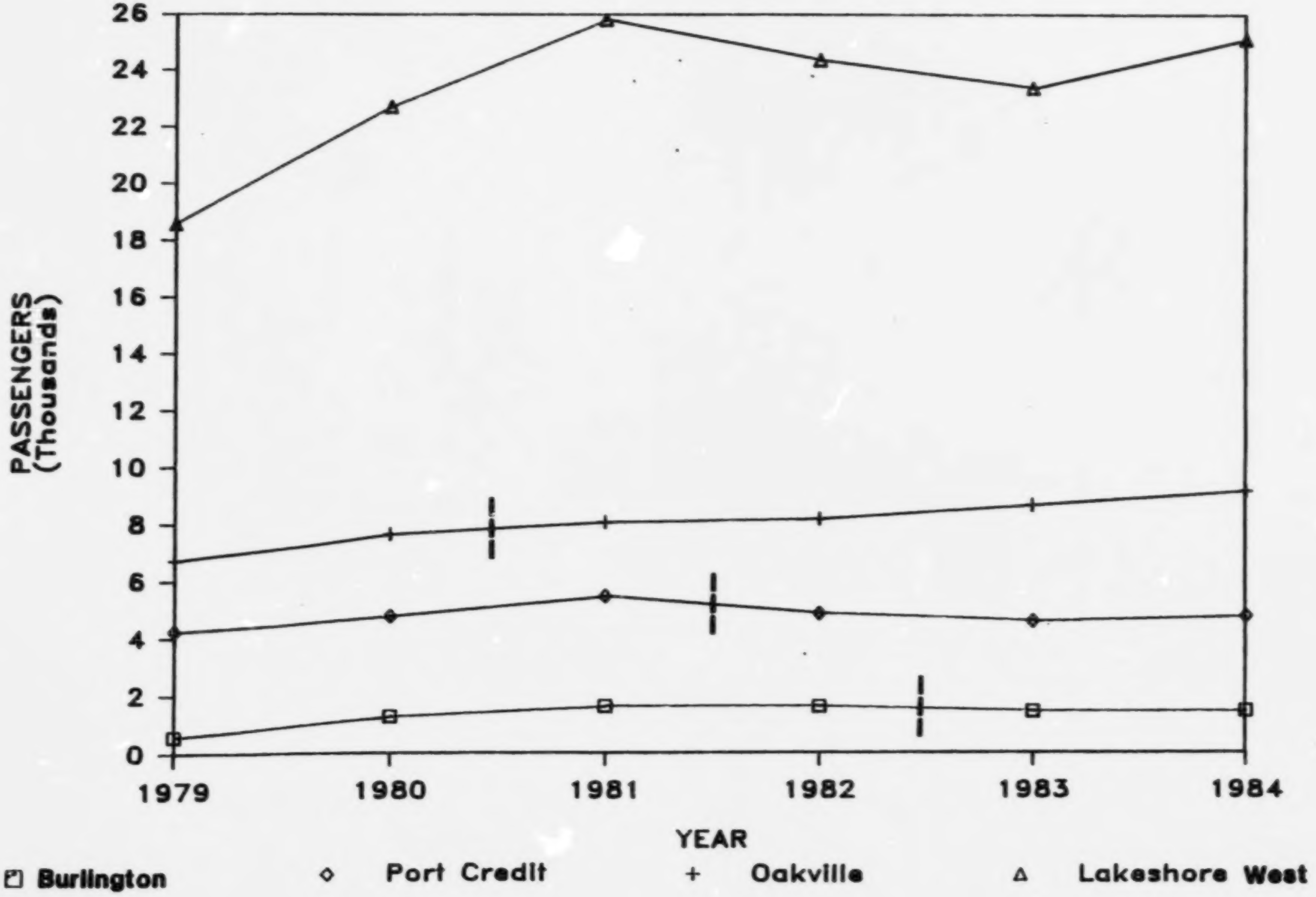
The results of the two surveys at the stations without fare integration are even more stable, with no particular trends by mode of egress between 1981 and 1983.

Exhibit 3.2 shows daily passenger volume through the stations and on the entire rail corridor for selected full and partial fare integration stations, between 1979 and 1984. The approximate date at which fare integration was implemented is also shown for each station. The results of this analysis indicate that the implementation of fare integration has not measurably influenced total passenger volume through the stations in question, and therefore the principal effect of fare integration has been to change passengers from other access modes to local transit. This point is also shown on Exhibit 3.3 where the change in total passenger volume and passengers egressing by local bus are shown for the same stations. Between 1981 four of the five stations increased the local transit access share by more than the average for the corridor. The exception was at the Port Credit Station in Mississauga where fare integration is only partial.

Exhibit 3.4 shows the breakdown of local bus egressing passengers and all passengers by fare media for the nine stations which are representative of full fare integration, partial fare/service integration and no fare or service integration respectively, as well as the average for all rail passengers on the GO Transit system. We are not able to distinguish any differences in the pattern of fare purchases by mode of egress for those stations which have full fare and service integration as well as those which have partial fare and service integration, with the exception of Port Credit and Meadowvale where monthly pass users comprise a somewhat higher share of total riders for the bus access mode as compared with all passengers. This is presumably the result of offering the supplementary Mississauga sticker on GO Transit passes as the only fare integration between the two transit services. The proportion of local transit passengers egressing the Guildwood station using a single ride ticket is higher than the station total; this is likely because the number of passengers involved is so small that the results are unreliable. In summary, the GO

EXHIBIT 3.2A

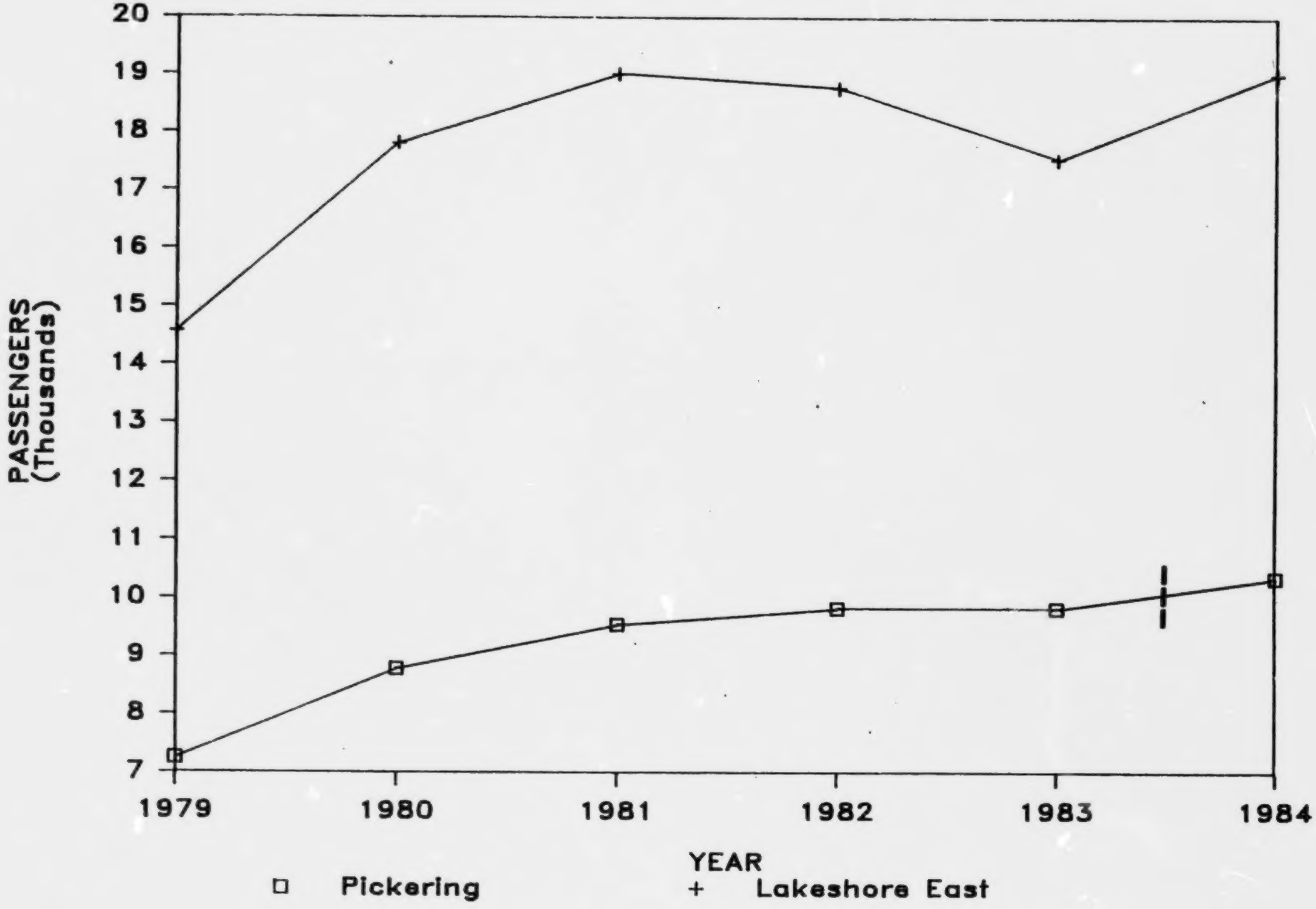
COMPARISON OF DAILY PASSENGER VOLUMES AT
SELECTED STATIONS AND THE TOTAL RAIL CORRIDOR
LAKESHORE WEST LINE



| Approximate time of fare integration.

EXHIBIT 3.2B

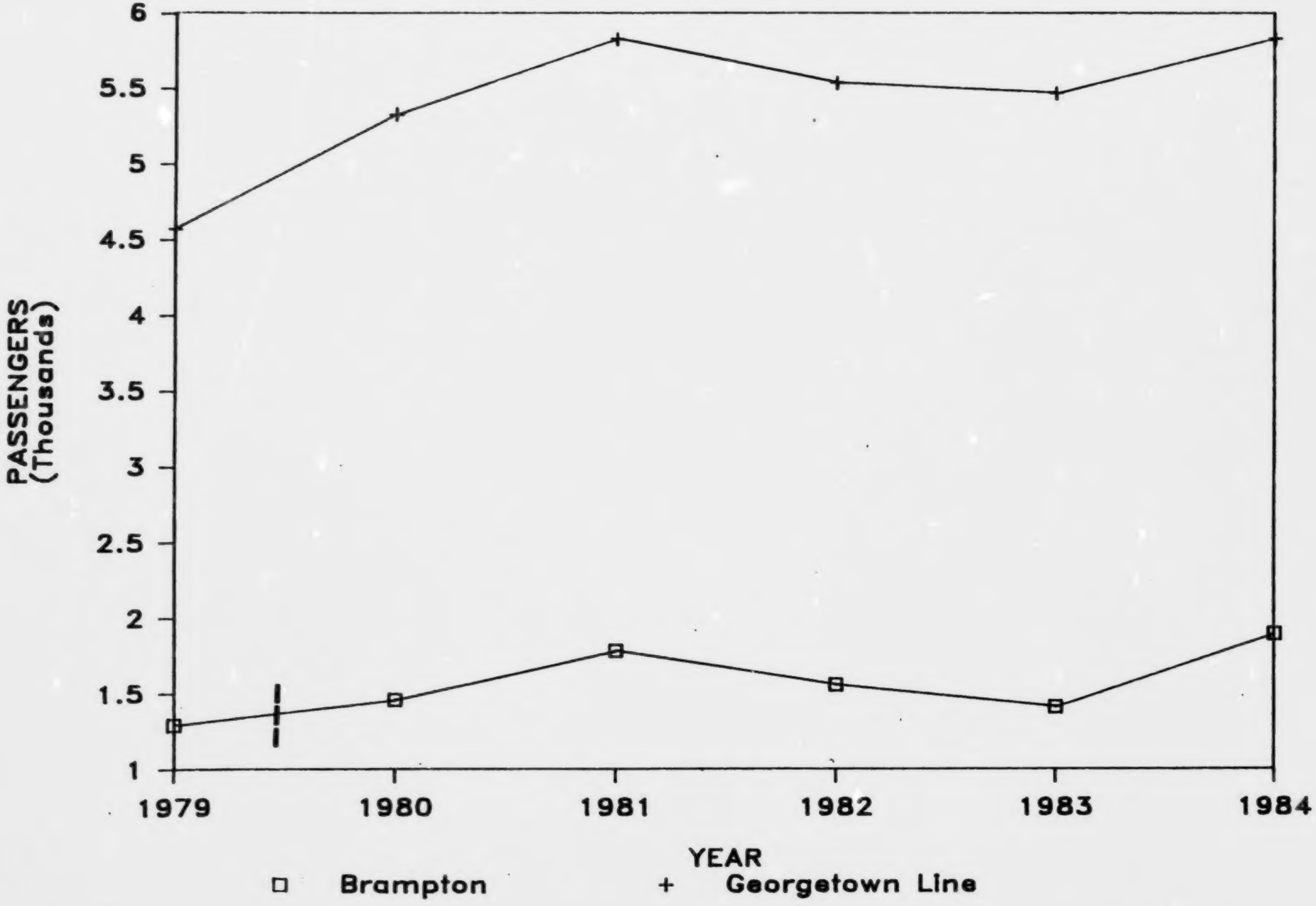
COMPARISON OF DAILY PASSENGER VOLUMES AT SELECTED STATIONS AND THE TOTAL RAIL CORRIDOR LAKESHORE EAST LINE



| Approximate time of fare integration.

EXHIBIT 3.2C

COMPARISON OF DAILY PASSENGER VOLUMES AT
SELECTED STATIONS AND THE TOTAL RAIL CORRIDOR
GEORGETOWN LINE



| Approximate time of fare integration.

EXHIBIT 3.3

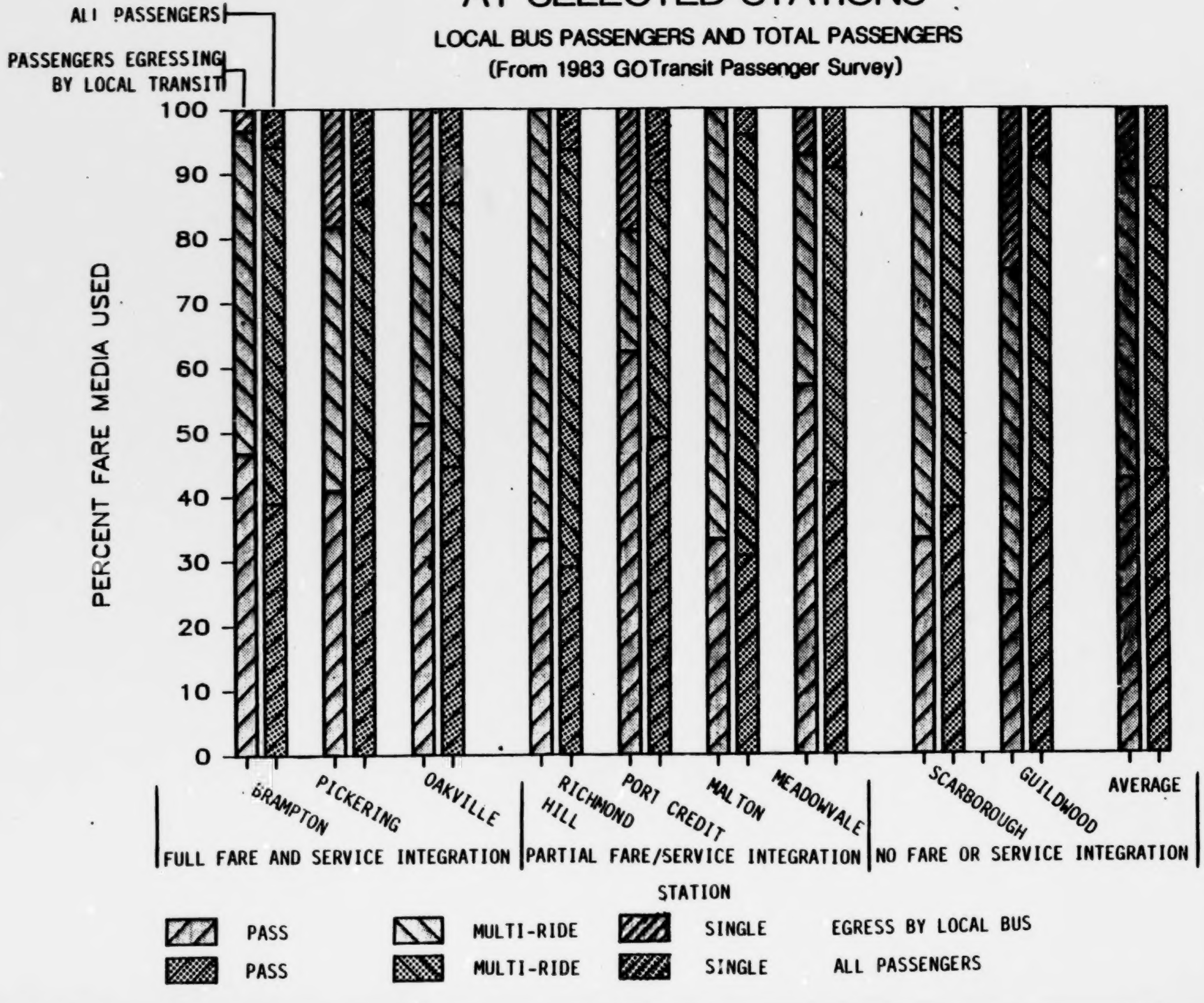
COMPARISON OF 1981 AND 1983 TOTAL PASSENGERS WITH LOCAL BUS EGRESSING PASSENGERS AT SELECTED STATIONS

STATION	% USING LOCAL BUS		PASSENGERS OFF AT STATION			PASSENGERS USING LOCAL BUS		
	1981	1983	1981	1983	% CHANGE	1981	1983	% CHANGE
BURLINGTON - LW	12.3	29.8	702	730	4.0	86	218	151.9
BRAMPTON - GT	20.3	29.7	761	939	23.4	154	279	80.5
PICKERING - LE	6.9	21.7	5,024	5,471	8.9	347	1,187	242.5
OAKVILLE -LW	28.8	41.5	4,578	4,650	1.6	1,318	1,930	46.4
PORT CREDIT - LW	10.2	15.8	2,571	2,309	-10.2	262	365	39.1
LAKESHORE WEST (LW)	15.4	23.4	12,918	12,376	-4.2	1,989	2,896	45.6
LAKESHORE EAST (LE)	4.9	14.9	9,379	9,224	-1.7	460	1,374	199.1
GEORGETOWN (GT)	13.6	18.9	2,665	2,689	0.9	362	508	40.2

EXHIBIT 3.4:

COMPARISON OF PASSENGERS BY FARE MEDIA AT SELECTED STATIONS

LOCAL BUS PASSENGERS AND TOTAL PASSENGERS
(From 1983 GOTransit Passenger Survey)



Transit fare integration schemes do not seem to encourage different types of riders (by fare medium) than the average for the stations at which fare integration is in operation.

Exhibit 3.5 shows the degree of captivity by local bus egress and in total for the same nine stations. As might be expected, the degree of captivity of local bus passengers is greater than those who use other modes of egress, the predominant one being the automobile. The degree of captivity of the local transit egressing passengers at those stations with full fare integration is generally lower than at those stations with partial or no fare/service integration. This may be because there is a greater incentive for non-transit captive riders to use local bus due to fare integration.

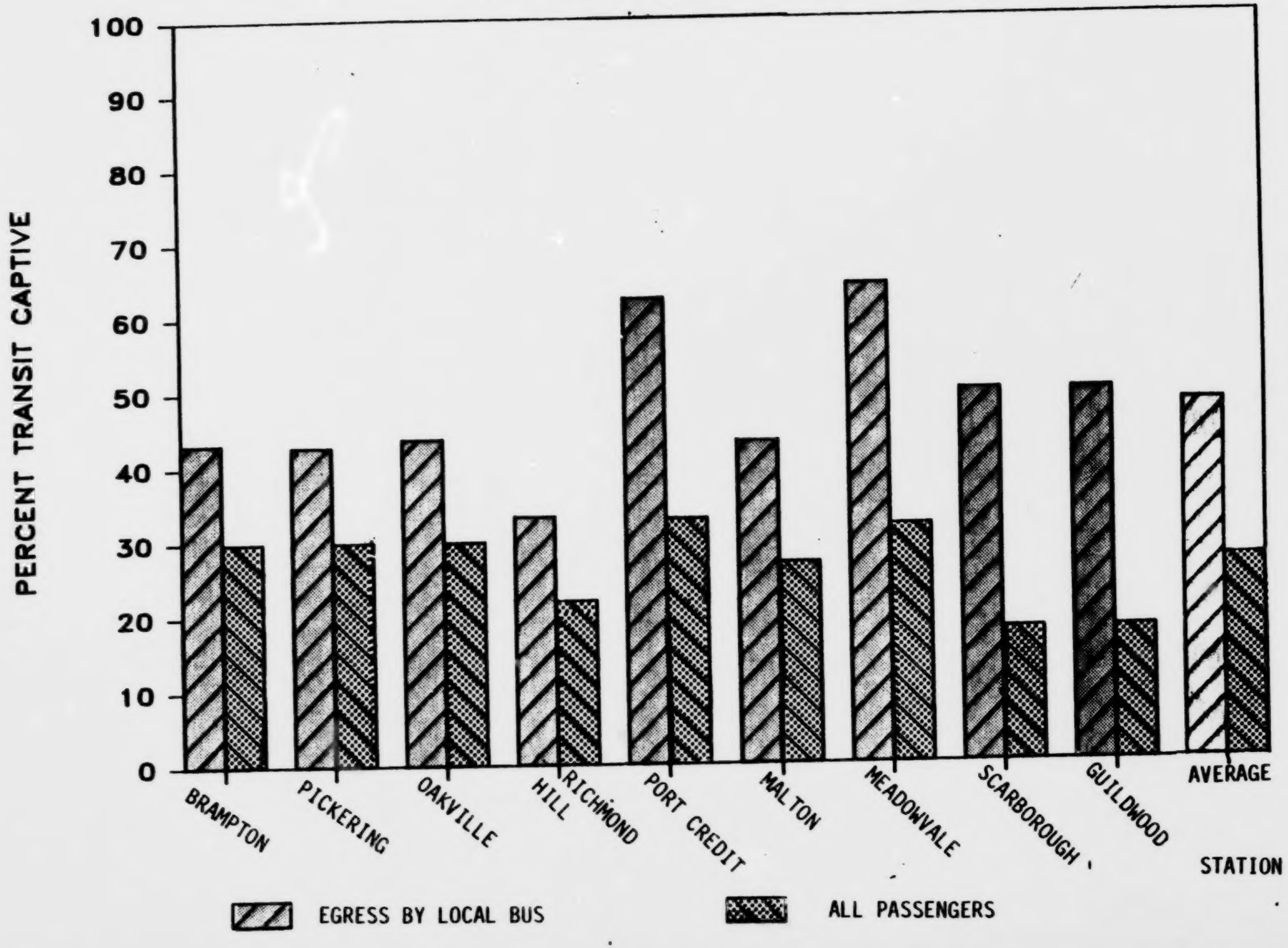
In summary, the implementation of full fare integration at GO Transit stations has resulted in a significant increase in ridership on the local transit systems accessing the GO stations, as well as a major shift in the modal share for local transit at those stations. The impacts of partial fare integration have been significantly less pronounced. Fare integration does not seem to have affected the relative attractiveness of GO Transit as a public transportation service. For stations with fare integration the characteristics of passengers accessing the station by local transit are not markedly different from the characteristics of all passengers.

EXHIBIT 3.5

COMPARISON OF TRANSIT CAPTIVES AT SELECTED STATIONS

LOCAL BUS PASSENGERS AND TOTAL PASSENGERS

(From 1983 GO Transit Passenger Survey)



4. EXISTING TRANSIT DEMAND

This section of the report provides a preliminary analysis of cross-boundary and inter-modal transfers between transit services operating within the study area. The data which provides the basis for this analysis consists of surveys and counts undertaken by several agencies. Due to the variations in the types of data collected, the final data base of cross-boundary and inter-modal trips is not totally comprehensive. Because most of the cross-boundary trips take place across the Metropolitan Toronto boundary, the following analysis concentrates principally on these movements.

CROSS-BOUNDARY TRIPS

Metro Toronto Cordon Count

Exhibit 4.1 shows the person trip count across the Metro Toronto boundary for the twelve hour 7:00 a.m. to 7:00 p.m. period in 1983.

During this twelve hour period on an average weekday, 1.1 million person trips cross the Metropolitan Toronto boundary. While these counts include trips which are through the region, the predominant majority of the trips have origins/destinations in Metropolitan Toronto.

The low percentage modal split by GO Rail across the northern boundary reflects the relatively low level of GO Rail service across this boundary, as compared with service to the east and west of Metro Toronto.

The most dramatic recent growth in trips to/from Metro Toronto has been from the north which has experienced a growth of 41% since 1979, as compared with 22% for the east boundary and 13% for the west boundary. This indicates the need for strengthening the public transit connections across the north boundary of Metro.

EXHIBIT 4.1

1983 METRO TORONTO CORDON COUNTS

DIRECTION	PASSENGER TRIPS (7AM - 7PM)	% BUS	% GO RAIL	% TRANSIT
FROM WEST	292,407	8.1	4.2	12.3
TO WEST	281,497	8.5	4.3	12.8
TOTAL WEST	573,904	8.3	4.2	12.5
FROM NORTH	203,633	6.3	0.5	6.8
TO NORTH	201,406	7.7	0.4	8.1
TOTAL NORTH	405,039	7.0	0.5	7.5
FROM EAST	60,977	9.5	6.7	16.2
TO EAST	59,813	7.2	6.7	13.9
TOTAL EAST	120,790	8.4	6.7	15.1
TOTAL TRIPS	1,099,733	7.8	3.1	10.9
% WEST	52			
% NORTH	37			
% EAST	11			

WEST - Mississauga Border
NORTH - Region of York Border
EAST - Pickering Border

Overall, the modal share of trips across the metro boundary by transit are relatively low. An increased proportion of total travel will have to be accommodated in the future by public transit to balance passenger demand and supply. This increase in supply will be facilitated by an increased level of integration between local and regional transit systems serving cross-boundary trips.

TTC Commuter Attitude Survey

In 1982 the TTC undertook a telephone survey of 4,000 residences outside of Metropolitan Toronto to determine the characteristics and attitudes of those who commuted to jobs in Metro Toronto using TTC and other modes.

Approximately 66% of those surveyed were in the labour force and of these an average of 35% commuted to Metro to work. Exhibit 4.2 shows the percent of the labour force from each of the regions adjacent to Metropolitan Toronto who commute to jobs in Metro. The east includes Ajax, Pickering and Whitby; the north includes the region of York; the west includes Mississauga and other western municipalities (Caledon, Brampton, Oakville and Burlington).

In both the areas east and north of Metro Toronto, approximately 45% of the labour force is employed in Metro Toronto. As a result of a somewhat more developed economic base, only 40% of those surveyed in Mississauga commute to jobs in Metro. 22% of the outlying municipalities labour force commuted to Metro Toronto, reflecting the effect of increased distance on work trip commuting.

This exhibit also shows a relatively high percentage of those surveyed who used public transit in their journey to work. When compared with the results of the cordon counts (Exhibit 4.1). Exhibit 4.2 shows that the commuters surveyed had a higher tendency to use public transit than the average passenger trip across the Metro Toronto boundaries.

Of those who do commute to work by public transportation, a higher percentage used TTC from the north and west regions, than from the east, where TTC access is not as readily available. In fact, commuters from the east principally transfer from GO Transit to the TTC at Union Station, as indicated by the 66% sub-mode access estimate in this exhibit.

The relatively poor public transit access to the TTC from the north corridor is reflected in the 61% of "other" (automobile) access to the TTC from this region.

The high degree of integration between Mississauga Transit and the TTC at the Islington subway station is shown by the high proportion (36%) of TTC passengers which access via the local transit system from Mississauga.

In summary, Exhibit 4.2 shows the very high degree of economic inter-dependence between Metropolitan Toronto and the surrounding municipalities. It also shows the effects of improved public transit service integration between the TTC and local/regional transit systems which enhance this economic inter-dependence. By comparison it shows where the public transit service integration is weakest and where an overall need exists to improve public transit integration across municipal boundaries.

Exhibit 4.3 shows the relative attractiveness of destinations in Metropolitan Toronto for work commuters who live in the adjacent municipalities. In all cases the City of Toronto (central area) is equally attractive as the adjacent Metro municipality for work trips generated outside the Metro boundary. For example, Etobicoke and Toronto CBD destinations are equally attractive for work trips generated in Mississauga, North York and Toronto CBD are equally attractive for work trips generated in York Region, and Scarborough and Toronto CBD are equally attractive for work trips generated in the eastern part of Durham Region. This means that while public transit generally serves the trips to the central area of Toronto well (this is reflected in a high modal split for trips from the adjacent municipalities to the central area), public transit does not

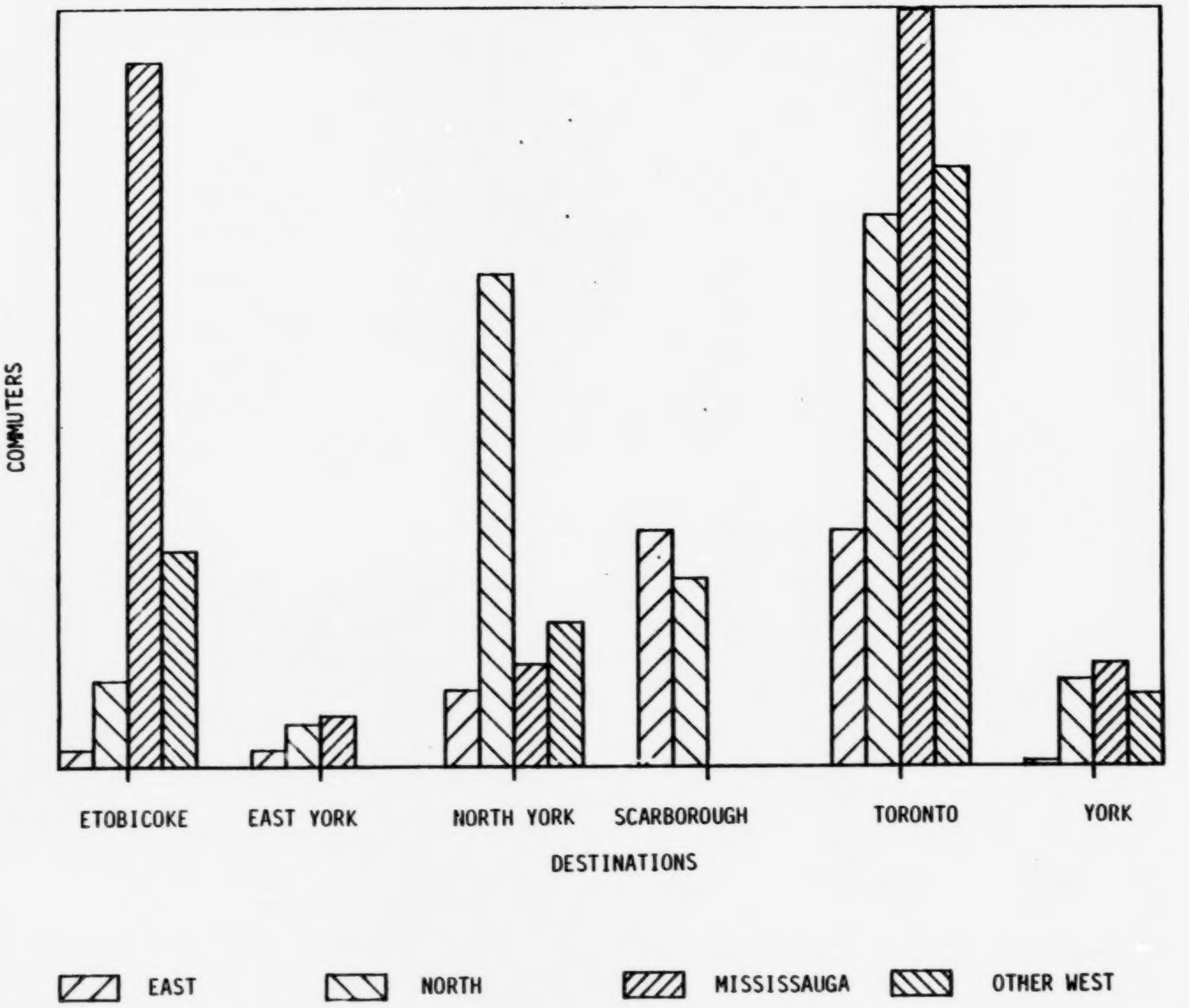
EXHIBIT 4.2

TTC - 1982 COMMUTER SURVEY

CHARACTERISTICS	EAST	NORTH	WEST			TOTAL
			MISS	OTHER	TOTAL	
% of LABOUR FORCE WORKING IN METRO TORONTO	45	45	40	22	30	35
% OF COMMUTERS USING PUBLIC TRANSIT IN THE JOURNEY TO WORK	23	22	24	27	25	24
% USING TTC IN JOURNEY TO WORK	9	18	14	11	13	14
TTC ACCESS (%)						
GO System	44	28	43	45	38	36
Local Transit	-	11	36	-	23	14
GO & Local Transit	22	-	7	27	8	7
Other	33	61	21	27	23	36
% OF COMMUTERS WITH NO PERCEIVED MODE ALTERNATIVE	75	76			67	70

EXHIBIT 4.3

ORIGINS OF COMMUTERS



capture anything like the same proportion of shorter distance trips to the outer Metro municipalities of Etobicoke, North York and Scarborough.

TTC Park and Ride Survey

In 1981 the TTC undertook a survey of park and ride subway patrons at terminals where there is a major park and ride component. This survey showed that of those who park and ride at the major terminals, between 89% and 96% are destined to locations south of Bloor Street. To the extent that this pattern reflects the destination characteristics of inter-modal passengers who access the subway by local transit systems from adjacent municipalities, this statistic strongly shows the role of the subway in serving the central area of Toronto work trips.

Mississauga Cross-Boundary Surveys

Mississauga Transit undertook surveys of cross-boundary passengers in 1979, 1980, 1982 and 1984.

As shown in Exhibit 4.4, cross-boundary trips on Mississauga Transit to the Islington subway station have grown by 32% from 1979 to 1984. While trips to non-subway destinations were not measured until 1982, it appears that approximately 35% of total cross-boundary travel on Mississauga Transit is to other, Etobicoke destinations. Or, in other words the number of Mississauga transit passengers who cross the boundary into Metro and then take the subway is twice that of the Mississauga Transit riders destined for Etobicoke.

A 1981 survey taken by the TTC of parking lot patrons at the Islington subway showed that 85% went to destinations in downtown Toronto (south of Bloor). Therefore it can be assumed that a similar travel pattern exists for transit patrons at the Islington stop accessing the subway station by Mississauga Transit. As shown earlier, twice as many Mississauga transit riders are destined to the Toronto CBD as to destinations in Etobicoke. The results of the TTC commuter survey showed that for

EXHIBIT 4.4

MISSISSAUGA TRANSIT CROSS-BOUNDARY TRIPS

SURVEY YEAR DESTINATION	AVERAGE WEEKDAY TRIPS 1979	 1980	 1981	 1984
ISLINGTON SUBWAY	12,018	12,772	14,962	15,852
KIPLING SUBWAY	N/A	N/A	N/A	171
NON-SUBWAY DESTINATIONS	N/A	N/A	8,182	8,700 *
TOTAL TORONTO	12,018	12,772	23,144	24,723
BRAMPTON	N/A	N/A	N/A	786

*Estimated using 1982 data
N/A - No data available

total trips out of Mississauga an equal number go to Etobicoke as to downtown Toronto. Thus, public transit is providing for approximately twice the proportion of trips to Toronto as to Etobicoke even though there is the same propensity to travel to either destination.

York Region Home Interview Survey

The Region of York undertook a home interview survey of the residents of south urban York (the urban municipalities abutting the north Metro boundary) in 1979/80. Exhibit 4.5 shows the work place distribution of residents of the south urban York region. Almost 60% of the labour force in this region are employed in Metro Toronto, a total of 30,000 one-way work trips daily.

The distribution of these work trips follows a pattern similar to that described in the previous section of this report dealing with the TTC commuter survey. Approximately 32% of the residents of South Urban York work in Toronto and 37% work in North York.

By comparison, Exhibit 4.6 shows the transit modal split for these work trips. Commuters to the central area of Toronto have a 60% modal split, as compared with a 10% modal split for public transit trips destined to points in North York. This again points out the need for improved service and fare integration for shorter distance public transit trips from the southern urban York communities to the northern parts of Metropolitan Toronto, if public transit is going to capture a larger share of these work trips.

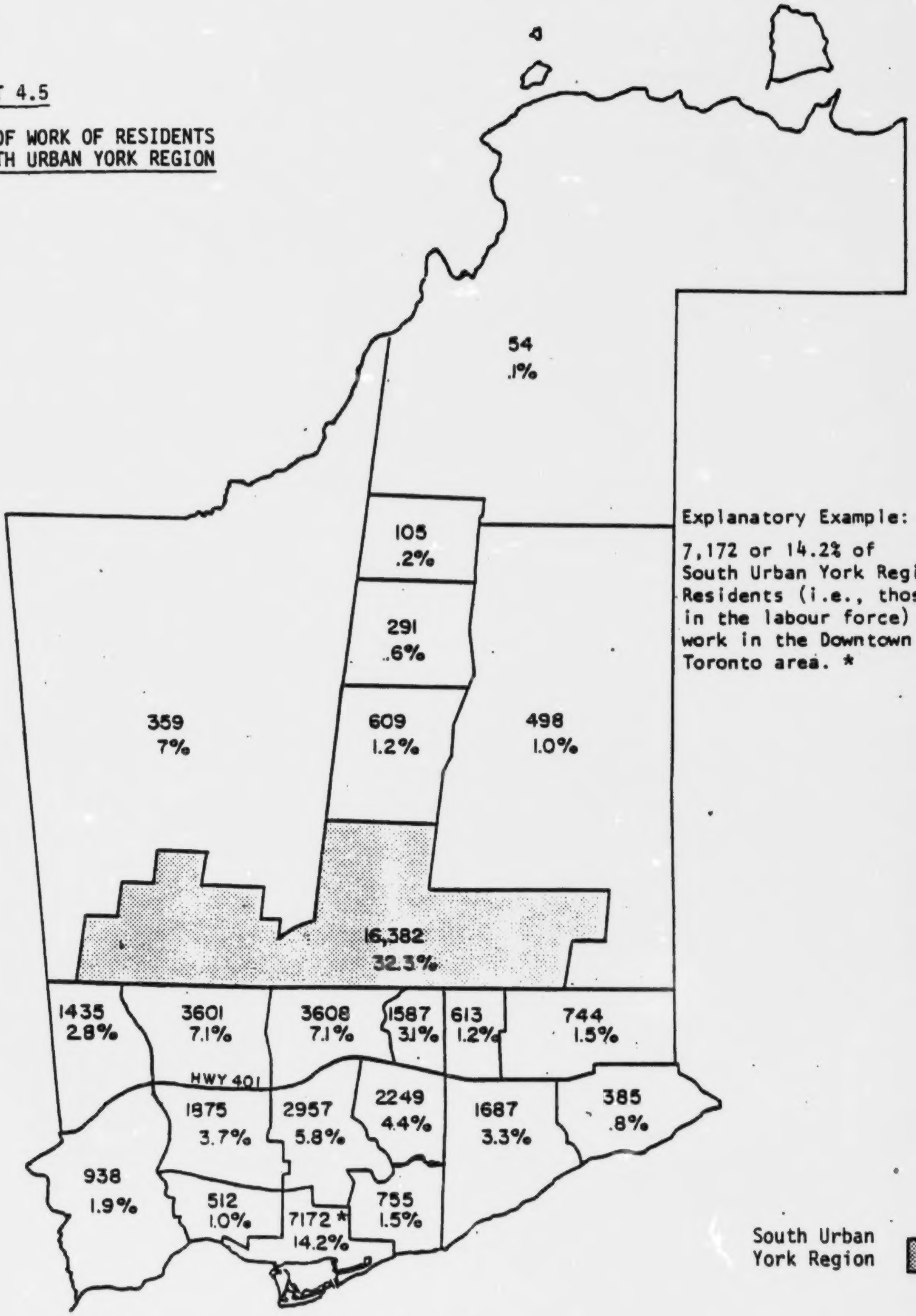
INTER-MODAL TRANSFERS

GO Transit Bus System

The bus interchange data presented in the Phase 1 report has been updated based on discussions with TTC staff. The following chart shows updated total daily volume for six terminals interchanging with the GO Transit bus system.

EXHIBIT 4.5

PLACE OF WORK OF RESIDENTS OF SOUTH URBAN YORK REGION


54
.1%
105
.2%
291
.6%
359
7%
609
1.2%
498
1.0%
16,382
32.3%
1435
2.8%
3601
7.1%
3608
7.1%
1587
3.1%
613
1.2%
744
1.5%
HWY 401
1875
3.7%
2957
5.8%
2249
4.4%
1687
3.3%
385
.8%
938
1.9%
512
1.0%
7172 *
14.2%
755
1.5%

Explanatory Example:

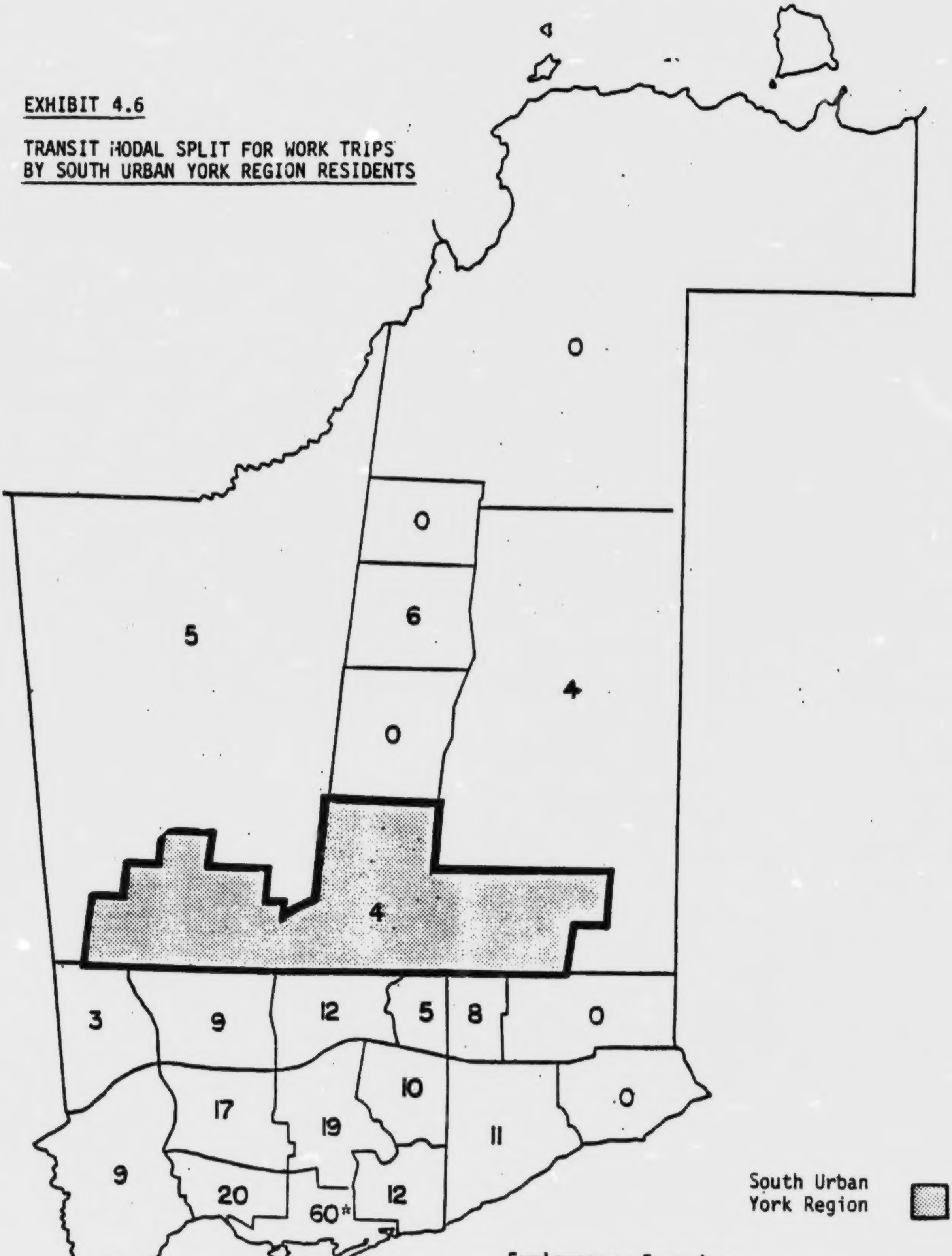
7,172 or 14.2% of South Urban York Regi Residents (i.e., thos in the labour force) work in the Downtown Toronto area. *

South Urban York Region

Source: 1979/80 York Home Interview Travel Survey

EXHIBIT 4.6

TRANSIT MODAL SPLIT FOR WORK TRIPS BY SOUTH URBAN YORK REGION RESIDENTS


4
0
0
6
5
0
4
4
3
9
12
5
8
0
10
0
17
19
11
9
20
60*
12
South Urban York Region ▨

Source: 1979/80 York Home Interview Travel Survey

Explanatory Example:

Of those residents of South Urban York Region who work in the Downtown Toronto area*, 60% travel to work by public transit.

Terminal	Daily Volume (2 way)
Finch	10,000
York Mills	1,000 - 2,000
Yorkdale	2,500 - 3,000
Bay/Dundas	800 - 1,000
Warden	100 - 600
Others	600
Total	15,000 - 17,200

The 10,000 passengers interchanging at the Finch terminal primarily relate to the GO Transit local service on Yonge Street from this terminal to Richmond Hill and Markham Transit.

GO Transit Rail System

The best source of GO Transit Rail passenger characteristics is the recent 1983 GO Transit passenger survey. The survey was carried out over one day in one direction on each of the rail lines operated by GO Transit. Exhibit 4.7 presents a summary of the inter-modal transfers in each direction, by municipality and for all rail corridors consolidated. The results which are discussed below primarily reflect the characteristics of work trips, since 87% of all trips on the GO Rail system were work oriented on the day of the survey.

Exhibit 4.7 shows that inbound trips from GO Rail stations in Toronto, where the local transit system is the most dense and mature, constitute 18% of total inbound trips on the rail system, but only 4% of those passengers access the GO Rail system by public transit, reflecting the poor level of service integration and no fare integration between the TTC and GO Transit. This compares with a transit access modal split of 20% to 39% in the outlying stations which have fare integration with the local transit system. In the outbound direction, 31% of passengers accessing the GO Rail system in Toronto (Union Station) do so by public transit. This reflects the work place location in the central area of commuters from outside Metro and the high degree of service integration between the TTC subway and the

EXHIBIT 4.7

1983 GO RAIL TRIPS
(Average Weekday Volume)

TRIP ORIGIN	INBOUND TRIPS			OUTBOUND TRIPS		
		ACCESS BY LOCAL BUS			ACCESS BY LOCAL BUS	
	TOTAL	Total	%	TOTAL	Total	%
TORONTO	5,175	229	4	27,856	8,682	31
BRAMPTON	1,679	452	27	38	7	18
PICKERING	5,498	1,078	20			
BURLINGTON	730	208	28			
HAMILTON	132	11	8			
GEORGETOWN	377	2	1			
MISSISSAUGA	7,789	968	12	379	217	57
OAKVILLE	4,861	1,843	38	2	2	100
MILTON	291	36	12			
OTHER	1,752	20	1			
TOTAL	28,284	4,847	17	28,275	8,908	31

SOURCE: 1983 GO Transit Survey

GO Rail system at Union Station. It is unlikely that a lack of fare integration between the TTC and GO Transit inhibits local transit access to the GO Rail system at Union Station.

SUMMARY

This demand analysis has pointed out a number of significant issues concerning fare integration for inter-modal and cross-boundary trips in the study area, as summarized below.

1. Trips across the Metropolitan Toronto boundary have increased substantially in the last four years and it can be expected that as Metro and the surrounding regions become increasingly inter-dependent, this trend will continue well into the future.
2. The high degree of economic inter-dependence was identified in the TTC commuter survey which established that 35% of work trips from the surrounding regions are to jobs in Metro Toronto. This ratio is even higher for municipalities immediately adjacent to the Metro boundary as indicated in the York Region survey which shows that 60% of the labour force in the south urban York municipalities commute to work in Metropolitan Toronto.
3. Work trips from municipalities adjacent to Metro Toronto are equally divided between the adjacent Metro municipality and downtown Toronto.
4. Public transit provides a much higher level of service to commuter work trips destined for the central area of Toronto, than for trips to the adjacent boroughs/cities of Metro. This is understandable in many respects, since the density of development in the central area of Toronto is much higher. However it does indicate a need to improve service and fare integration between municipalities adjacent to Metro and the Metro borough if this increasingly important travel demand is to be accommodated on public transportation.
5. Better service and fare integration between the TTC and the GO Rail system at stations within Metro would encourage use of the GO Rail system in Metro to a greater extent than at the present time, and some of this use might benefit the TTC, for example by alleviating the heavily congested parts of the subway system.

5. MANAGER'S SURVEY

Most of the transit management people who were interviewed identified some problems relating to service and fare integration. The policy level interviews have not been completed yet and are not reported on here.

The following is a summary of the points raised relating to the need for improved fare/service integration within the study area:

- both Hamilton and Burlington acknowledge that there is a relatively low level of service integration between the two municipalities even though they are strongly oriented to each other. In addition, Burlington is presently not satisfied with the level of service and fare integration between HSR and Burlington Transit. Passengers travelling from Hamilton to Burlington are only required to pay a single fare (the HSR fare) and Burlington recognizes the HSR transfers, giving free access to these passengers on the Burlington Transit system. Burlington, however does not obtain any passenger revenue from these passengers. On the other hand, for travel between Burlington and Hamilton, Burlington Transit passengers must pay two fares, the Burlington fare and the HSR fare, since the HSR will not accept the Burlington transfer;
- GO Transit has indicated that it may wish to transfer responsibility for its Lakeshore bus service to the respective local transit properties along that route. This would in turn raise the issue of fare and service integration for those passengers who now travel between municipalities on the GO Lakeshore service. This is a particularly important issue on the York Street/Plains Road service between downtown Hamilton and downtown Burlington;
- since both Oakville and Burlington have fare integration agreements with GO Transit, students living in Burlington and attending Sheridan College in Oakville in effect get two free local transit rides for their Burlington to Oakville GO Transit fare. Thus, the subsidy to Oakville and Burlington is in excess of the fare received by GO Transit for these trips;

- over half of the passengers who ride the Mississauga Transit system transfer to the TTC subway at Islington. This amounts to roughly 15,000 passengers per day transfering at the subway. There is no fare integration and all passengers pay two fares, although the trip lengths are such that the passengers do not seem to be concerned with the total cost of the fare;

- better physical integration of Mississauga Transit passengers at the subway terminal would benefit all parties;

- three services now operate between Mississauga and Brampton, one on Highway 10, the second on Dixie Road and the third on Torbram Road into Malton. The Highway 10 route requires two fares (Mississauga and Brampton) for passengers crossing the municipal boundary and is operated by Mississauga Transit; Mississauga Transit is not allowed to carry local passengers in Brampton. Payment of the two fares provides for a free transfer to Brampton transit at the interface terminal. The Dixie Road service requires only the payment of a single fare and transfers to Mississauga Transit at the interface point requires payment of the second fare. The Torbram Road service requires payment of two fares for cross-boundary trips. Local passengers are carried on this service within Mississauga for the payment of a single fare. Passengers may transfer free to both Mississauga and TTC routes which operate within Malton but must pay an additional fare if they travel into Metro Toronto on the TTC;

- further service integration between Brampton and Toronto may be warranted in the future, along Steeles Avenue to Albion Road and between Brampton and Mississauga along Bramalea Road to Derry Road and along West Drive/Tomken to Derry Road;

- 8% of TTC ridership now involves passengers who cross the Metropolitan Toronto boundary; this is expected to increase to 12% within 10 years. The bulk of the ridership growth over this period is expected to come from persons living outside Metro.

- Vaughan, Richmond Hill (GO Transit Yonge Street service) and Markham Transit services are strongly oriented to Metro Toronto. A number of fare equity and fare integration issues relate to their current operations. For example, passengers traveling within

Vaughan and within Markham in an east-west direction often use TTC Steeles Avenue services and this involves the payment of two fares for travel within the single municipality. GO Transit buses which travel east and west along Major MacKenzie Drive and merge into the local GO Transit Yonge Street service are not allowed to pick up passengers as they approach Yonge Street within Richmond Hill without payment of $1.35 minimum fare, even though a few blocks east the buses go into local service at a 65¢ fare on Yonge Street. The TTC and Markham Transit duplicate service on Steeles Avenue between Kennedy Road and Don Mills Road. Within Richmond Hill the fare between Oak Ridges and downtown Richmond Hill is 65¢ on Richmond Hill Transit and $1.65 on GO Transit. Markham, Richmond Hill and Vaughan expect significant increases in ridership over the next five years and this in turn will promote the need for better service integration and fare integration with TTC and GO Transit;

- service and fare integration would benefit local residents of Ajax and Pickering. Currently the only service between the two is by GO bus and if local transit services are included it represents a very high fare;
- the same issue exists between Whitby and Oshawa but on a larger scale. In both cases there are local political restraints to achieving fare and service integration;
- the GO-ALRT service through the Durham Region will significantly re-orient the local transit services and this in turn will tend to encourage fare and service integration with GO Transit and between the municipal transit services. All four municipalities recognize the need for a better transit connection between them;
- Oshawa Transit has expressed a desire for fare integration with the GO bus service operating in the 401/Highway 2 corridor;
- several transit managers indicated that the potential financial impact of fare integration was a big issue, implying that significant losses of fare revenue as a result of fare integration could not be tolerated;
- several transit managers indicated a desire for fare integration with the GO Transit bus service although they realize that this would not be as easy to administer and control as a fare integration scheme with the GO rail system;

- most managers indicated that the Ministry would have to play a prominent role in implementing fare integration because of the uncertainty associated with the potential impact it would have on local transit operations and the general reluctance at the local political level to move in this direction.

APPENDIX A

TRANSIT CONTACTS

TRANSIT CONTACTS

Ajax Transit	Les Pearce, Transit Liaison Officer
Brampton Transit	Chris Prentice, Transit Manager
Burlington Transit	Tim Dobbie, Asst. Director, Public Works - Transportation Bob Young, Manager of Transit Operations
Hamilton Street Railway	Heinz Schweinbenz, Public Transit Manager
Markham Transit	Donald Gordon, Transit Coordinator
Mississauga Transit	Ed Dowling, General Manager
Newmarket Transit	Jim Barber, Transit Coordinator
Oakville Transit	Bob Evans, Transit Manager
Oshawa Transit	Lloyd Algar, General Manager and Chief Engineer Cal Cathmoir, Superintendent
Pickering Transit	George Papik, Director of Transportation
Richmind Hill Transit	Bud Newton, Transit Coordinator
Toronto Transit Commission	Juri Pill, Executive Director - Planning
Town of Vaughan	Jim Kimble, Senior Engineering Assistant
Town of Whitby	Dick Kuwahara, Director of Public Works

Personnel from Aurora and Milton were contacted to obtain information on their fare structures, but were not personally interviewed.

APPENDIX B

DESCRIPTION OF HSR CONCESSIONARY FARE POLICY

DESCRIPTION OF HSR CONCESSIONARY FARE POLICY

SUMMARY OF FARES - PASSES, IDENTIFICATION CARDS, AND CERTIFICATES

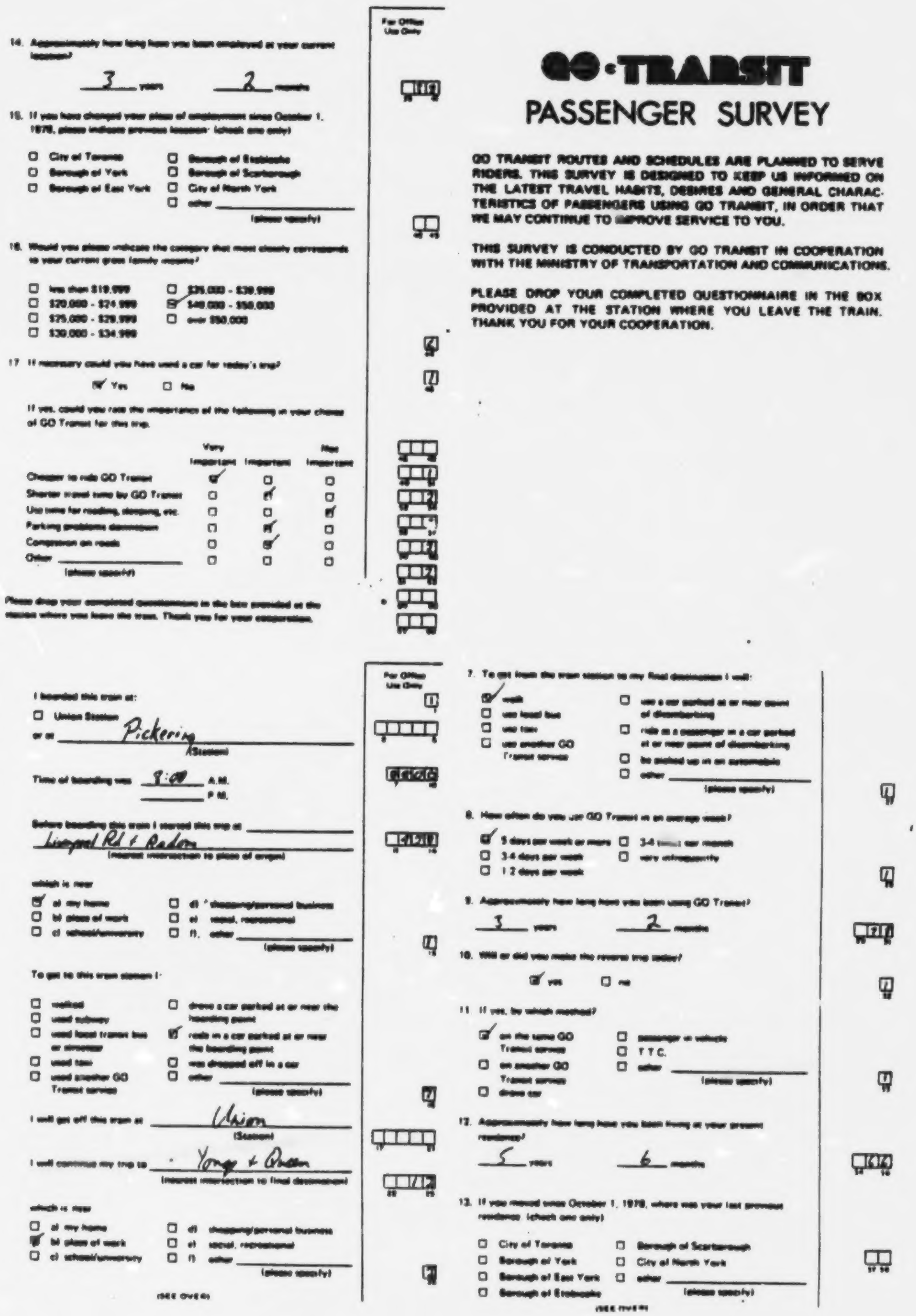
CASH	TICKET	MONTHLY PASS			IDENTIFICATION
85¢	10/$7.50	$30.00	ADULT		——
85¢	5/$2.25	$17.00	STUDENT (Under 19 Years of Age)	1. 2. 3.	H.S.R. Student Certificate (form 119) Board of Education - combined Student Card and H.S.R. Student Certificate Separate School Board - combined Athletic Card and H.S.R. Student Certificate
30¢	5/$1.50	——	CHILDREN	1.	5 to 14 years, under 60 inches
85¢	10/$7.50	$28.00	MOHAWK (Purchase at) (Mohawk College only)	1. 2.	Mohawk College Student Card Mohawk College Short Program Student Identification Card
85¢	10/$7.50	$28.00	MCMASTER (Purchase at McMaster) (Library only)	1.	McMaster Identity Card
85¢	5/$2.25	$17.00	SENIOR	1.	Ontario Senior Citizen Privilege Card (either copy)
85¢	5/$2.25	$17.00	GROUP "A" PASS (Purchase at City Hall) (& HSR Ticket Office only)	1.	Special Rate Transportation Certificate - GROUP "A" (Hamilton Only)
85¢	5/$2.25	——	SPECIAL ADULT	1.	Special Rate Transportation Certificate - HAMILTON - STONEY CREEK - ANCASTER
85¢¢	5/$2.25	$17.00 ——	GROUP "B" PASS (Purchase at Community) (Town Hall only)	1.	Special Rate Transportation Certificate - GROUP "B" (Issued monthly at their (resident) City Clerk's Office.)
—	——	NOMINAL CHARGE	SENIOR CITIZEN (ANNUAL PASS) (Purchase at City Hall only)		(Combination Pass and I.D. Card)
—	——	N/C	TRANSIT PASS FOR V.I.P. AND H.S.R. RETIRED EMPLOYEES		(Combination Pass and I.D. Card)
—	——	N/C	EMPLOYEES		(Combination Pass and I.D. Card)
—	——	N/C	WAR AMPUTEES		(V.I.P. Pass for 1984)
—	—	N/C	BLIND		(V.I.P. Pass for 1984)
—	——	N/C	REGIONAL POLICE		In Uniform or Badge
			12 PASSES		17 I.D. CARDS

April 1, 1984

APPENDIX C

GO TRANSIT SURVEY FORMS - 1981 AND 1983

1981 GO TRANSIT PASSENGER SURVEY



14. Approximately how long have you been employed at your current location?

3 years 2 months

15. If you have changed your place of employment since October 1, 1978, please indicate previous location: (check one only)

- ☐ City of Toronto
- ☐ Borough of York
- ☐ Borough of East York
- ☐ Borough of Etobicoke
- ☐ Borough of Scarborough
- ☐ City of North York
- ☐ other ______ (please specify)

16. Would you please indicate the category that most closely corresponds to your current gross family income?

- ☐ less than $19,999
- ☐ $20,000 - $24,999
- ☐ $25,000 - $29,999
- ☐ $30,000 - $34,999
- ☐ $35,000 - $39,999
- ☑ $40,000 - $50,000
- ☐ over $50,000

17. If necessary could you have used a car for today's trip?

☑ Yes ☐ No

If yes, could you rate the importance of the following in your choice of GO Transit for this trip.

	Very Important	Important	Not Important
Cheaper to ride GO Transit	☑	☐	☐
Shorter travel time by GO Transit	☐	☑	☐
Use time for reading, sleeping, etc.	☐	☐	☑
Parking problems downtown	☐	☑	☐
Congestion on roads	☐	☑	☐
Other ______ (please specify)	☐	☐	☐

Please drop your completed questionnaire in the box provided at the station where you leave the train. Thank you for your cooperation.

For Office Use Only

GO·TRANSIT PASSENGER SURVEY

GO TRANSIT ROUTES AND SCHEDULES ARE PLANNED TO SERVE RIDERS. THIS SURVEY IS DESIGNED TO KEEP US INFORMED ON THE LATEST TRAVEL HABITS, DESIRES AND GENERAL CHARACTERISTICS OF PASSENGERS USING GO TRANSIT, IN ORDER THAT WE MAY CONTINUE TO IMPROVE SERVICE TO YOU.

THIS SURVEY IS CONDUCTED BY GO TRANSIT IN COOPERATION WITH THE MINISTRY OF TRANSPORTATION AND COMMUNICATIONS.

PLEASE DROP YOUR COMPLETED QUESTIONNAIRE IN THE BOX PROVIDED AT THE STATION WHERE YOU LEAVE THE TRAIN. THANK YOU FOR YOUR COOPERATION.

I boarded this train at:

☐ Union Station

or at Pickering (Station)

Time of boarding was 9:00 A.M.

______ P.M.

Before boarding this train I started this trip at Liverpool Rd + Radom (nearest intersection to place of origin)

which is near

- ☑ a) my home
- ☐ b) place of work
- ☐ c) school/university
- ☐ d) shopping/personal business
- ☐ e) social, recreational
- ☐ f). other ______ (please specify)

To get to this train station I:

- ☐ walked
- ☐ used subway
- ☐ used local transit bus or streetcar
- ☐ used taxi
- ☐ used another GO Transit service
- ☐ drove a car parked at or near the boarding point
- ☑ rode in a car parked at or near the boarding point
- ☐ was dropped off in a car
- ☐ other ______ (please specify)

I will get off this train at Union (Station)

I will continue my trip to Yonge + Queen (nearest intersection to final destination)

which is near

- ☐ a) my home
- ☑ b) place of work
- ☐ c) school/university
- ☐ d) shopping/personal business
- ☐ e) social, recreational
- ☐ f) other ______ (please specify)

(SEE OVER)

For Office Use Only

7. To get from the train station to my final destination I will:

- ☑ walk
- ☐ use local bus
- ☐ use taxi
- ☐ use another GO Transit service
- ☐ use a car parked at or near point of disembarking
- ☐ ride as a passenger in a car parked at or near point of disembarking
- ☐ be picked up in an automobile
- ☐ other ______ (please specify)

8. How often do you use GO Transit in an average week?

- ☑ 5 days per week or more
- ☐ 3-4 days per week
- ☐ 1-2 days per week
- ☐ 3-4 times per month
- ☐ very infrequently

9. Approximately how long have you been using GO Transit?

3 years 2 months

10. Will or did you make the reverse trip today?

☑ yes ☐ no

11. If yes, by which method?

- ☑ on the same GO Transit service
- ☐ on another GO Transit service
- ☐ drove car
- ☐ passenger in vehicle
- ☐ T.T.C.
- ☐ other ______ (please specify)

12. Approximately how long have you been living at your present residence?

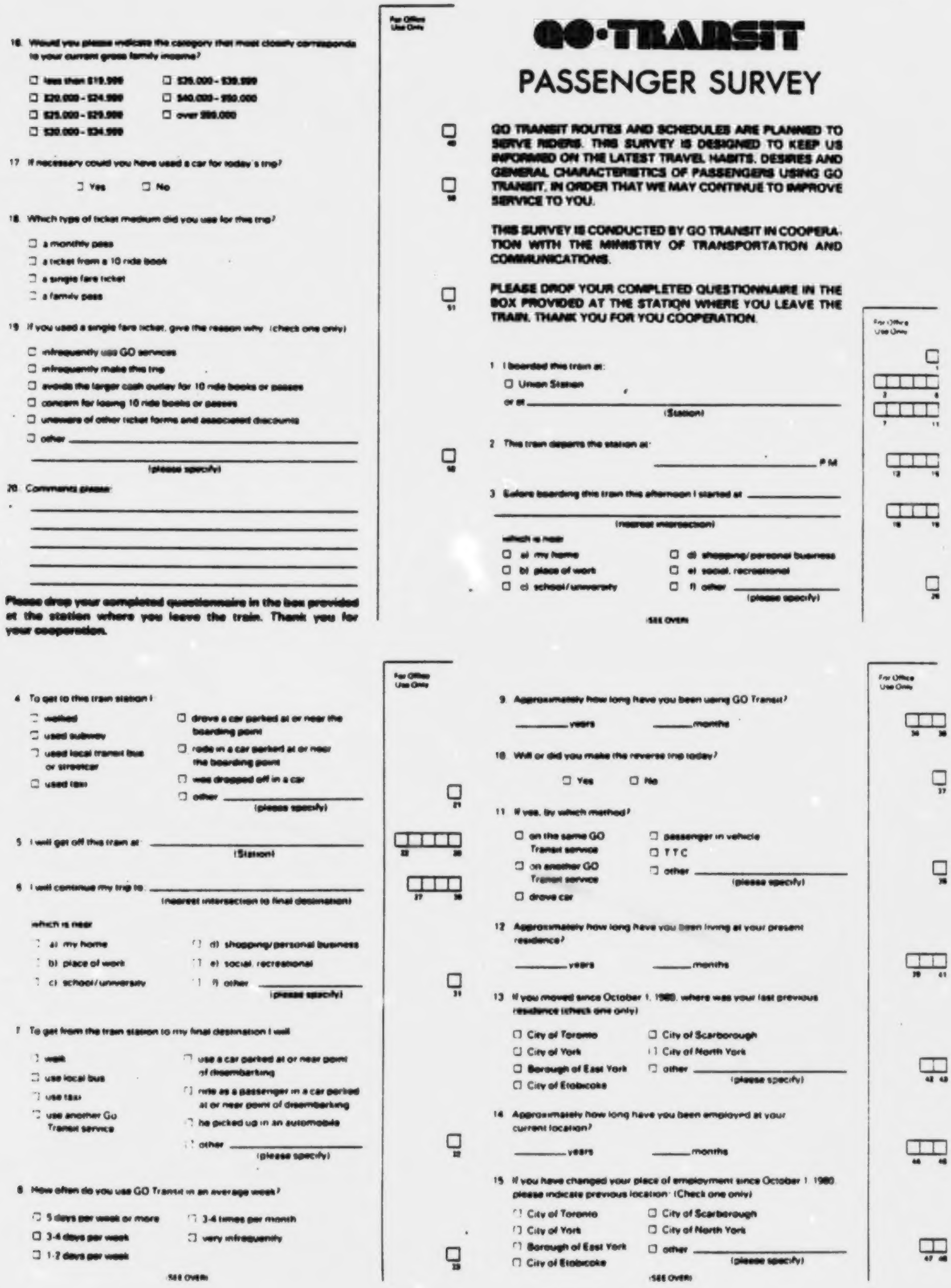
5 years 6 months

13. If you moved since October 1, 1978, where was your last previous residence: (check one only)

- ☐ City of Toronto
- ☐ Borough of York
- ☐ Borough of East York
- ☐ Borough of Etobicoke
- ☐ Borough of Scarborough
- ☐ City of North York
- ☐ other ______ (please specify)

(SEE OVER)

1983 GO TRANSIT PASSENGER SURVEY



16. Would you please indicate the category that most closely corresponds to your current gross family income?

☐ less than $19,999
☐ $20,000 - $24,999
☐ $25,000 - $29,999
☐ $30,000 - $34,999
☐ $35,000 - $39,999
☐ $40,000 - $50,000
☐ over $50,000

17. If necessary could you have used a car for today's trip?

☐ Yes ☐ No

18. Which type of ticket medium did you use for this trip?

☐ a monthly pass
☐ a ticket from a 10 ride book
☐ a single fare ticket
☐ a family pass

19. If you used a single fare ticket, give the reason why (check one only)

☐ infrequently use GO services
☐ infrequently make this trip
☐ avoids the larger cash outlay for 10 ride books or passes
☐ concern for losing 10 ride books or passes
☐ unaware of other ticket forms and associated discounts
☐ other ______________________
____
(please specify)

20. Comments please:
____
____
____
____
____

Please drop your completed questionnaire in the box provided at the station where you leave the train. Thank you for your cooperation.

For Office Use Only
☐ 49
☐ 50
☐ 51
☐ 52

GO·TRANSIT

PASSENGER SURVEY

GO TRANSIT ROUTES AND SCHEDULES ARE PLANNED TO SERVE RIDERS. THIS SURVEY IS DESIGNED TO KEEP US INFORMED ON THE LATEST TRAVEL HABITS, DESIRES AND GENERAL CHARACTERISTICS OF PASSENGERS USING GO TRANSIT, IN ORDER THAT WE MAY CONTINUE TO IMPROVE SERVICE TO YOU.

THIS SURVEY IS CONDUCTED BY GO TRANSIT IN COOPERATION WITH THE MINISTRY OF TRANSPORTATION AND COMMUNICATIONS.

PLEASE DROP YOUR COMPLETED QUESTIONNAIRE IN THE BOX PROVIDED AT THE STATION WHERE YOU LEAVE THE TRAIN. THANK YOU FOR YOU COOPERATION.

1. I boarded this train at:

☐ Union Station
or at ______________________
(Station)

2. This train departs the station at:

______________________ P.M.

3. Before boarding this train this afternoon I started at ______________________
____
(nearest intersection)

which is near

☐ a) my home
☐ b) place of work
☐ c) school/university
☐ d) shopping/personal business
☐ e) social, recreational
☐ f) other ______________________
(please specify)

(SEE OVER)

For Office Use Only
☐ 1
☐☐☐☐☐ 2 6
☐☐☐☐☐ 7 11
☐☐☐☐ 12 15
☐☐☐☐ 16 19
☐ 20

---

4. To get to this train station I

☐ walked
☐ used subway
☐ used local transit bus or streetcar
☐ used taxi
☐ drove a car parked at or near the boarding point
☐ rode in a car parked at or near the boarding point
☐ was dropped off in a car
☐ other ______________________
(please specify)

5. I will get off this train at: ______________________
(Station)

6. I will continue my trip to: ______________________
(nearest intersection to final destination)

which is near

☐ a) my home
☐ b) place of work
☐ c) school/university
☐ d) shopping/personal business
☐ e) social, recreational
☐ f) other ______________________
(please specify)

7. To get from the train station to my final destination I will

☐ walk
☐ use local bus
☐ use taxi
☐ use another Go Transit service
☐ use a car parked at or near point of disembarking
☐ ride as a passenger in a car parked at or near point of disembarking
☐ be picked up in an automobile
☐ other ______________________
(please specify)

8. How often do you use GO Transit in an average week?

☐ 5 days per week or more
☐ 3-4 days per week
☐ 1-2 days per week
☐ 3-4 times per month
☐ very infrequently

(SEE OVER)

For Office Use Only
☐ 21
☐☐☐☐☐ 22 26
☐☐☐☐ 27 30
☐ 31
☐ 32
☐ 33

---

9. Approximately how long have you been using GO Transit?

__________ years __________ months

10. Will or did you make the reverse trip today?

☐ Yes ☐ No

11. If yes, by which method?

☐ on the same GO Transit service
☐ on another GO Transit service
☐ drove car
☐ passenger in vehicle
☐ T T C
☐ other ______________________
(please specify)

12. Approximately how long have you been living at your present residence?

__________ years __________ months

13. If you moved since October 1, 1980, where was your last previous residence (check one only)

☐ City of Toronto
☐ City of York
☐ Borough of East York
☐ City of Etobicoke
☐ City of Scarborough
☐ City of North York
☐ other ______________________
(please specify)

14. Approximately how long have you been employed at your current location?

__________ years __________ months

15. If you have changed your place of employment since October 1, 1980 please indicate previous location: (Check one only)

☐ City of Toronto
☐ City of York
☐ Borough of East York
☐ City of Etobicoke
☐ City of Scarborough
☐ City of North York
☐ other ______________________
(please specify)

(SEE OVER)

For Office Use Only
☐☐☐ 34 36
☐ 37
☐ 38
☐☐☐ 39 41
☐☐ 42 43
☐☐☐ 44 46
☐☐ 47 48

Volume

2

Ontario

Ministry of
Transportation and
Communications

TRANSIT FARE INTEGRATION IN THE TORONTO AREA - PHASE II

Review of Developments in Other Jurisdictions

Volume 2

MARCH 1985

IBI
GROUP

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

TRANSIT FARE INTEGRATION IN THE TORONTO AREA - PHASE II

REVIEW OF DEVELOPMENTS IN OTHER JURISDICTIONS
VOLUME 2

IBI GROUP
in Association with
J.W. Leas & Associates
and
Paterson Planning and Research Limited

March, 1985

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1. INTRODUCTION AND SUMMARY

JURISDICTIONS SURVEYED

This report describes the results of a survey of jurisdictions outside Canada where full or partial fare integration has been implemented. Following a search of European and American data bases, the following jurisdictions were chosen for the survey:

- London, England - two carriers, London Transport and British Rail provide the public transit service in an urban region of 6.7 million population. London Transport operates under the political jurisdiction of the Greater London Council;
- Tyne & Wear, England - this metropolitan region of 1.1 million population has implemented the first fully integrated fare system in Britain;
- Netherlands - the experience in the Netherlands represents the most radical fare integration experiment in the world, with the entire country of 13.5 million included within the same fare integration system covering urban and intercity public transit services;
- Rhine-Ruhr, West Germany - with 23 municipalities encompassing a population of 8 million, this is the largest Transit Union implemented to date in Germany;
- Munich, West Germany - unlike the Rhine-Ruhr union which emcompasses a multi-centred region, the Munich region is centred on the City of Munich;
- Perth, Australia - public transit services in Perth are provided by a single carrier which also has the political mandate to implement fare integration;
- San Francisco Bay Area, United States - the responsibility for planning, operating and funding public transit in this large urban region containing a population of 4.3 million is distributed over a large number of agencies and this has hampered attempts to achieve fare integration objectives;

- San Diego, United States - with a similar political and operating environment to the San Francisco Bay Area, the San Diego region has been successful in achieving its initial fare integration goals encompassing a regional pass and transfer program.

These jurisdictions were chosen to provide a range of experience, in terms of the number of carriers, the political environment and the ambitiousness of the fare integration objectives.

Each jurisdiction was contacted directly to request their participation in the survey, and once this was received they were mailed a survey form which requested the following types of detailed information:

- the conditions that existed prior to implementing fare integration, particularly those which prompted fare integration and fare policy coordination;
- the specific objectives that the fare integration scheme was intended to achieve;
- the details of the implementation of fare integration;
- a description of the fare integration scheme as it is now operated;
- the impacts which fare integration has had on the affected government agencies, the public transportation operators and the passengers;
- the current status of the fare integration schemes and a description of plans for changes.

A copy of the survey form is provided in Appendix A.

SUMMARY OF EXPERIENCE

The following is a summary of the results of the survey, which is followed by an interpretation of its results in the context of the Metropolitan Toronto Region. Exhibit 1.1 summarizes the results which are described in more detail in the following chapters of this report.

MUNICH	PARIS
5,000 sq.km (1,950 sq.mi)	4,000 sq.km (1,600 sq.mi)
2.3 million	9.5 million
City of Munich 8 regional districts 170 smaller towns and cities	The Central Government has a major role in the fare structure, level of service, and organization of public transit services in the Paris Region. As part of a plan to decentralize government, a new regional government structure is being established which will take over some Central Government responsibilities and will participate with local government in policy and operational decision-making.
460 million (all carriers) (200 rides/capita/annum)	Metro 1,156 million Regional Express and Suburban Rail 714 million Bus 904 million 2,774 million (290 rides/capita/annum)
- Munich Municipal Transit Authority (SMV) - German Federal Railway (DB) - German Federal Post Office - 40 private bus operators	RAIP (La Regie Autonome des Transports Parisiens) - metro, Regional Express Rail (partial) and bus network, over an area containing 7.3 million population. SNCF (French National Railway) - Regional Express Rail (partial) & suburban passenger rail services. APIR (Association of Private Bus Operators) - suburban bus services
N/A, but assumed to be distance-based on the DB services, and either stage or zone fares on the bus and rail services	Metro - flat fare RER and bus services - stage fare
Intermodal transfers not permitted without payment of an extra fare	Intermodal transfers not permitted without extra fare payment
- Manual inspection of tickets	Turnstiles activated by magnetic tickets on the Metro and Paris sections of RER, manual inspection of tickets on buses
- Paper tickets - Single ride, multi-ride and period passes	- Paper single ride and ticket books - 12 ride weekly passes - tourist passes (unlimited use)
- Capital subsidies through the Federal and State Governments as well as the municipalities (minor) - Operating subsidies through the municipalities (and the Federal Government for the DB)	- Capital grants from Central and Paris governments cover 60 of capital investments (equal proportions), remainder is financed by RAIP - Variety of operational subsidies from Central and local governments
- 43% cost includes some capital costs not covered by Federal and State subsidies	- 46% (costs include principal and interest payments on RAIP share of capital debt).

EXHIBIT 1.1 (CONTINUED)
CHARACTERISTICS OF FARE INTEGRATION SCHEMES IN OTHER JURISDICTIONS

	PARIS	PERTH	SAN FRANCISCO BAY AREA	SAN DIEGO
	4,000 sq.km (1,600 sq.mi)	3,200 sq.km (1,250 sq.mi)	3,400 sq.km (1,330 sq.mi)	1,150 sq.km (450 sq.mi)
	9.5 million	1 million	4.3 million	1.2 million
	The Central Government has a major role in the fare structure, level of service, and organization of public transit services in the Paris Region. As part of a plan to decentralize government, a new regional government structure is being established which will take over some Central Government responsibilities and will participate with local government in policy and operational decision-making.	The Metropolitan Perth Passenger Transit (MTT), a semi-autonomous agency of the Western Australia (State) Government, has ownership and operating responsibility for all public transportation services in the region	- 9 countries with direct operating responsibility - Metropolitan Transportation Commission (MTC) responsible for transportation planning & administration of key subsidies: Transit Operator Coordinating Council (TOCC) for informal policy coordination	7 cities 1 county Metropolitan Transit Development Board (MTDB) - responsible for transportation planning and administration of some of the transit subsidies - SANDAG - The San Diego Association of Governments is responsible for the administration of transit subsidies which are allocated to the local municipalities
	Metro 1,156 million Regional Express and Suburban Rail 714 million Bus 904 million 2,774 million (290 rides/capita/annum)	Bus 47 million Rail 9 million Ferry 0.3 million (56 rides/capita/annum)	300 million (70 rides/capita/annum)	25 million (21 rides/capita/annum)
ity	RATP (La Regie Autonome des Transports Parisiens) - metro, Regional Express Rail (partial) and bus network, over an area containing 7.3 million population. SNCF (French National Railway) - Regional Express Rail (partial) & suburban passenger rail services. APTR (Association of Private Bus Operators) - suburban bus services	- MTT - bus and ferry services - Western Australian Government Railways (WAGR) rail services	- 5 major bus systems - 2 commuter rail systems - 4 small bus systems	- 5 major bus operators - 6 dial-a-ride operators - 1 light rail service
sed ge or vices	Metro - flat fare RER and bus services - stage fare	- Bus - stage fare - Rail - distance fare - Ferry - flat fare	- 2 had flat fares - 3 had zone fares - 1 had a mixture of zone and flat fares - 1 had distance-based fare	- Flat fares with premium fares for express services - Various discounts for elderly, handicapped and children - Monthly passes on some systems
d	Intermodal transfers not permitted without extra fare payment	Intermodal transfers not permitted without extra fare payment	Some transfers permitted free Some transfers at reduced second fare Most transfers with payment of a full 2nd fare	Intermodal transfers not permitted without second fare payment
	Turnstiles activated by magnetic tickets on the Metro and Paris sections of RER, manual inspection of tickets on buses	- Manual inspection of tickets	- Gate controlled stored fare magnetic ticket system (BART) - Manual inspection of tickets (zone fare systems) - Exact cash fare (flat fare systems)	- Cash fares
iod	- Paper single ride and ticket books - 12 ride weekly passes - tourist passes (unlimited use)	- Paper tickets issued on board the buses and at rail stations - Single ride tickets - 28 day tickets - Reduced fares for students	- Magnetic tickets (BART) - Paper tickets (zone fare systems) - Cash (flat fare systems) - Single ride - 20 and 40 ride tickets - weekly & monthly period passes	- Cash fares - A variety of monthly passes
s or)	- Capital grants from Central and Paris goverments cover 60% of capital investments (equal proportions), remainder is financed by RATP - Variety of operational subsidies from Central and local governments	- Capital and operating costs are the responsibility of the MTT which is funded by the State Government	- A wide variety of local, state and federal capital and operating subsidies which are administered through different agencies and coordinated by the MTC	- A wide variety of local, state and federal capital and operating subsidies which are administered through different agencies and coordinated by the MTC
d	- 46% (costs include principal and interest payments on RATP share of capital debt).	N/A	- Varies from 10% (Santa Clara County) to 52% (BART). Regional total 33%	Varies from 16% (County Suburban Bus System) to 75% (San Diego Trolley). Regional avg. 40%
		- Prior to fare integration MTT acquired private bus operators and rationalized routes and services	- A significant proportion of passengers require an intermodal transfer	- Responsibilities and coordination between operators was quite fragmented

EXHIBIT I.1
CHARACTERISTICS OF FARE INTEGRATION SCHEMES IN OTHER JURISDICTIONS

	LONDON	TYNE & WEAR
BACKGROUND		
SERVICE AREA	1,660 sq.km (650 sq.mi)	535 sq.km (209 sq.mi)
POPULATION	6.7 million	1.1 million
POLITICAL STRUCTURE	Greater London Council (GLC) controls regional services including public transit in - 32 boroughs - City of London	Metropolitan County of Tyne & Wear controls public transit service in: - City of Newcastle - Large number of smaller towns and cities
ANNUAL PUBLIC TRANSIT RIDERSHIP	Bus 1,200 million Underground 600 million British Rail 200 million Total: 2,000 million (300 rides/capita/annum)	N/A
CONDITIONS PRIOR TO FARE INTEGRATION		
PUBLIC TRANSIT OPERATORS	London Transit (LT) - Bus & underground British Rail (BR) - commuter rail	- Tyne & Wear PTE - bus - United Automobile Service - Bus - Northern General Ltd - bus - British Rail - local rail - The implementation of an extensive Light Rail Transit System (Metro) in Newcastle and environs prompted major bus service and fares restructuring
FARE STRUCTURE	- Distance based on rail - Fare stages on bus - Surcharge on Central London travel	- Stage fare on bus services - substantial distance taper - distance based fare on BR
TRANSFER PRIVILEGES	Intermodal transfers not permitted without extra fare payment	Intermodal transfers not permitted without extra fare payment
FARE COLLECTION SYSTEM	- Manual inspection of tickets	- Manual inspection of tickets
FARE MEDIA AND TYPES	- Paper tickets - Single ride, period passes and tourist system passes	- Paper tickets - Single ride tickets - Period passes (Traveltickets)
SUBSIDIES	- Capital grants from Central Government - Operating subsidies from GLC	- Capital grants from Central Government cover majcr share of capital costs - Fixed annual operating subsidy from central government, remainder from local sources
REVENUE/COST RATIO	- 72% (LT)	
OTHER	- Major gyrations in fares on LT services took place from 1977 to 1983	

TYNE & WEAR	NETHERLANDS	RHINE-RUHR
m (209 sq.mi)	35,800 sq.km (14,000 sq.mi)	5,000 sq.km (1,950 sq.mi)
ion	13.5 million	8.0 million
atan County of Tyne & Wear public transit service of Newcastle number of smaller towns ities	The Central Government has total financial and policy responsibility for the provision of urban and intercity public transportation except intercity rail services which are the responsibility of the National Railway 50 municipalities provide local transit service. The 9 provinces have no authority for public transportation. The majority of taxes in the Netherlands are levied through the Central Government.	The Rhine-Ruhr region is an urban conurbation including 23 municipalities. The Transit Union (VRR) is the largest in Germany.
N/A	N/A	900 million (1980) on: 20 public transit systems including the German Federal Railway (DB) (112 rides/capita/annum)
Wear PTE - bus Automobile Service - Bus rn General Ltd - bus h Rail - local rail plementation of an exten- ight Rail Transit System) in Newcastle and envi- rompted major bus service res restructuring	- More than 100 urban and intercity operators	- 19 municipal transit agencies - German Federal Railway (DB)
fare on bus services - ntial distance taper ce based fare on BR	Intercity-distance based and stage fare systems Urban - most were flat fare, with a few using coarse concentric zones high variability on fare structure due to different subsidy rates	- 6 had stage fares - 2 had flat fares - 1 had a distance fare (DB) - 7 had zone fares - 4 had radial zone fares
l transfers not permitted xtra fare payment	Intermodal transfers not permitted without extra fare payment	Intermodal transfers not permitted without extra fare payment
inspection of tickets	- Manual inspection of tickets	- Manual inspection of tickets
ickets ride tickets passes (Traveltickets)	- Paper tickets - Single ride tickets and cash fares - a variety of multi-ride and period passes	- Paper single ride tickets - Multi-ride tickets - Period passes
grants from Central ent cover major share of costs nnual operating subsidy ntral government, der from local sources	- Operating subsidies were provided by both Central and Municipal Governments	- Each municipal transit operator received local and senior government capital and operating subsidies
	- Regional bus services 35% - Local transit services 25%	N/A
	In 1976 Central Government took over responsibility for all public transportation to implement integrated public transit system objectives (including fares)	The construction of the Stadtbahn a regional rapid transit rail link stimulated the formation of the VRR

EXHIBIT 1.1
CHARACTERISTICS OF FARE INTEGRATION SCHEMES IN OTHER JURISDICTIONS

	LONDON	TY
OBJECTIVES OF FARE INTEGRATION	- Simpler fare structure - Intermodal transfer capability - Encouragement of rail mode for trips to Central London - One man operation on buses - Increase use of ticket vending equipment - reduce fare administration costs - reduce fraud	- Flexibility meet revenu - Facilitate passengers - Fare by dis - Use proven - Compatabil gated Metro inspection
IMPLEMENTATION & CHARACTERISTICS OF FARE INTEGRATION		
IMPLEMENTATION DATE	May, 1983 though preparatory steps taken over previous two years	November, 1979 increase. Ref years
IMPLEMENTING AGENCY	LT under direction of GLC	Tyne & Wear PT
FARE STRUCTURE	- Zone fare for LT bus and underground services. Five very large radial rail zones and 3 radial bus zones - Single ride tickets (mode specific) - Period passes (Travelcards) valid for both bus and rail use - Bus only period passes	- 5 km hexagon - Stage bus f 5 km - Single ride - "Transfares single trips - Travelticket - Magnetic tic Metro system sold through and onboard
MULTIRIDE DISCOUNTS	Travelcards - weekly - 9.3 x single ride fare - monthly- 36 x single ride fare - quarterly- 102 single ride fare - annual - 380 x single ride fare	Traveltickets - weekly - 6.8 - 4 weeks- 25 - annual - 291
FARE REVENUE DISTRIBUTION	Periodic surveys of passengers	PTE retains all reimburses carr costs

HER JURISDICTIONS

	TYNE & WEAR	NETHERLANDS	RHINE & RUHR
ure capability il mode for ndon n buses ket vending tration	- Flexibility to set fares to meet revenue targets - Facilitate transferring passengers - Fare by distance equity - Use proven and tested equipment - Compatability with unattended gated Metro stations and visual inspection of tickets on buses	- Simplify the fare system - Rationalize the fare structure (except National Railway)	- Reduction in barriers to intermodal transferring - uniformity in tariff regulations - Simplify fare structure, ticket sales system - decrease in the number of different period pass types
atory steps o years	November, 1979 including 30% fare increase. Refinements took 3 more years	May, 1980	January, 1980
LC	Tyne & Wear PTE	Ministry of Transport and Public Works	Task force of carrier representatives set up the basis for the VRR and VRR managed the planning and implementation of the fare structure change
and . Five il zones es (mode lcards) nd rail use es	- 5 km hexagonal zone structure - Stage bus fares for trips up to 5 km - Single ride fares - "Transfares" for intermodal single trips - Traveltickets (period passes) - Magnetic ticket required for Metro system entry. These are sold through vending machines and onboard buses	- 4 to 4-1/2 km zone system with 2,800 zones in the entire country - Rural communities and smaller urban areas within a single zone - Virtually all fare payments are off vehicle at 8,000 ticket agencies - Basis of fare payment is the Strippenkaart (multi-ride ticket). On vehicle purchases are surcharged 40% over ticket agency purchases. Weekly, monthly, and annual period passes also available. - Complete flexibility to use Strippenkaart throughout the country and to convert it into a daily ticket	- 6-7 km zone system - 62 zones overall - Single ride, multi-ride tickets, weekly and monthly period passes - Child, students, seniors concessions - Stage fare for short trips
e ride fare ride fare e ride fare e ride fare	Traveltickets - weekly - 6.8 x single ride fare - 4 weeks- 25 x single ride fare - annual - 291 x single ride fare	- There are no single ride fares - Basic fare costs 2" strips "for first zone ($0.28) and 1 strip ($0.14) for each additional zone of travel - Period passes - weekly - 11 x single fare - monthly - 34 x single fare - annual - 340 x single fare	Period passes - weekly - 7.5 x single ride fare - monthly - 30 x single ride fare
engers	PTE retains all fare revenue and reimburses carriers for operating costs	All fare revenue goes to the Central Government which pays operaring costs of carriers	- Fare revenues collected by individual carriers but reported to VRR - VRR reimburses carriers for the differences between fare revenue and calculated costs

MUNICH	PARIS	
- Integration of services - Integration of fare system and standardization of fare policies - Equitable distribution of fare revenues	- Fare equity with a fare structure employing a distance taper to reduce the cost of long distance trips - Encourage the use of public transit for suburban trips - Facilitate transferring passengers between carriers	Fare eq - Simp coll - Incr
May, 1972	1975	August,
Munich Transport Community (MVV)	Le Syndicat des Transports Parisiens (STP) an agency to coordinate public transit in the Paris region	MTT
- Concentric ring segmented zones - Single ride tickets - Multi-ride tickets - Period passes (weekly, monthly) - Stage fares for short trips	- Flat fare on Metro - Stage fare on City and suburban buses - Flat fare within City on RER, stage fare outside - Radial zone structure with zones approx. 5km. wide for the Carte Orange (weekly, monthly, annual pass).	- Coar zone plus zone betw - Sing stam - 28 d - Half - Stud

- Strip (multi-ride) ticket available at an 18% discount over single ride fares
- Period passes
  - weekly 9 x single ride fare
  - monthly 36 x single ride fare
	Carte Orange
	- weekly - 7 x single ride fare
	- monthly- 25 x single ride fare
	- annual - 270 x single ride fare
	- weekly "12 ride" route specific passes available at 60% discount over single ride fare
		28 day price

All fare revenue accrues to the MVV. Revenue is distributed to the operating agencies based on the amount of service provided	- Ticket and 12 ride weekly pass revenue goes directly to carriers - Carte Orange revenue distributed to RATP & SNCF based on sales and use. APTR compensated directly by STP.	MTT rece

EXHIBIT 1.1 (CONTINUED)

CHARACTERISTICS OF FARE INTEGRATION SCHEMES IN OTHER JURISDICTIONS

PARIS	PERTH	SAN FRANCISCO BAY AREA	SAN DIEGO
with a fare mploying a distance duce the cost of ce trips he use of public suburban trips transferring between carriers	Fare equity - Simplify fare issuing and collecting procedures - Increase passenger convenience	- Uniformity in fare policies between AC Transit BART and MUNI - Enhance passenger convenience and flexibility - More flexible pricing at different times of the day	Creation of a regional rather than fragmented public transit system - Encouragement of regional transit ridership - Improvement in fare equity
	August, 1974	- AC Transit/Muni Joint monthly pass (October, 1981) - BART/Muni FastPass (Apr'83) - CalTrain Peninsula Pass (May'84)	July, 1981
Transports) an agency to lic transit in the	MTT	Operating agencies coordinated by the MTC	MTDB in cooperation with SANDAG and the majority of the carriers
n Metro on City and suburban ithin City on RER, outside structure with . 5km. wide for the (weekly, monthly,).	- Coarse zone fare - 2 radial zones within Perth Metro area, plus 2 outer zones. Overlap zone for short distance travel between zones 1 and 2 - Single ride tickets (time stamped) - 28 day period pass - Half price child ticket - Student restricted passes	- AC Transit/Muni pass provides for unlimited monthly travel on Muni and the AC Transit Transbay Bus Service at a cost of the 2 individual passes less $2 - BART/Muni pass allows unlimited use of BART service within San Francisco by Muni passholders at no extra cost - CalTrain Peninsula pass, at a $10 monthly premium over the CalTrain zone pass, provides unlimited use of feeder services to the commuter train	- 3 levels of service with a flat fare: 1. local/feeder - 75¢ 2. urban - 80¢ 3. metro - $1.00 The San Diego trolley has a zone fare structure - Transfers from equal or higher level of service are free but from lower level of service requires payment of the difference in the 2 fares - Regional Ready Pass provides unlimited monthly travel among 7 carriers
single ride fare x single ride fare x single ride fare de" route specific able at 60% r single ride fare	28 day pass - 30 x single ride price	N/A	- 10 ride ticket on the San Diego Trolley priced at 5% discount - Monthly pass at approximately 36 x single fare (Metro)
ride weekly pass directly to revenue to RATP & SNCF es and use. ATR directly by STP.	MTT receives all fare revenue	N/A	- Cash fares and transfer supplements accrue to each operator - Ready Pass revenues are distributed on pass use counts by each operator

EXHIBIT 1.1

CHARACTERISTICS OF FARE INTEGRATION SCHEMES IN OTHER JURISDICTIONS

	LONDON	
FARE INTEGRATION IMPACTS	- 30% increase in Travelcard (period pass) purchases - 60% increase in travel by Travelcard holders - Fraud reduction - Coincident fare structure changes encouraged major swing from bus to underground for trips to central London - Revenue cost ratio - not available but assumed to be about the same as before fare integration	- Steady in since far to the Me attractiv of new fa
STATUS	- Travelcard planned for extension to include BR - Major plan being developed to combine magnetic ticket technology with visual overprint for single ride fares. These would be valid in gated stations as well as in open stations and on board buses - One day Travelcards are also being considered.	- On bus fa improveme to enhanc Metro - Multi-rid introduce

ER JURISDICTIONS

	TYNE & WEAR	NETHERLANDS	RHINE & RUHR
elcard ees el by ture jor swing nd for don not avai- be about are inte-	- Steady increase in ridership since fare change due in part to the Metro and to attractiveness and simplicity of new fares	- System was readily accepted by passengers - Measuring ridership impact and financial performance by carrier has been difficult - Boarding times have improved - Fare administration costs have decreased - Subsidy system does not encourage operator efficiency	- New fare system readily accepted by passengers - Because cost reimbursement is provided carriers also accepted the new scheme - New standardized fare media had to be introduced
or BR eloped to ket techno- rprint for These would tions as ons and on re also	- On bus fare collection improvements are being studied to enhance compatability with Metro - Multi-ride tickets will be introduced in the future	- Stored value magnetic ticket proposed for implementation - Variety of special fares being considered - More responsibility for efficient performance to be required of carriers	- Some fine tuning is planned but no major changes are deemed necessary - More tickets will be sold through vending machines in the future

MUNICH	PARIS	
- Initial implementation did not include the private bus companies - they were added 5 years later - Financial performance, ridership and productivity improved substantially following implementation. Revenue/Cost ratio increased from 43% in 1973 to 52% in 1982	- 60% of all public transit trips now use the Carte Orange - ridership increased by 22% over 9 years - Employment tax implemented to cover fare revenue losses related to the Carte Orange - Objectives have been achieved	- A maj syste 1983 repla - More also inclu recip and u - Rider 1974- - two h ha; c
Some revisions to the fare distribution formula appear to be planned	- STP planned to be replaced by a department of regional government - Carte Orange may be expended to daily pass and single ride multimodal ticket - Further consolidation of 5 radial zones to 4 is planned - Improved methods of paying for Carte Orange being implemented	Plan to tickets revenue

EXHIBIT 1.1 (CONTINUED)

CHARACTERISTICS OF FARE INTEGRATION SCHEMES IN OTHER JURISDICTIONS

S	PERTH	SAN FRANCISCO BAY AREA	SAN DIEGO
c transit trips Orange ed by 22% over plemented to losses rte Orange een achieved	- A major revision to the zone system was implemented in July, 1983 with 6 radial zones replacing the initial 2 - More concessionary fares were also introduced in 1983, including pensioners, recipients of social welfare, and unemployed - Ridership declined over the 1974-1983 period - two hour time limit on tickets has caused abuse	900 joint AC Transit/Muni passes sold monthly - 18,000 Muni passholders use BART service daily - 2,200 CalTrain Peninsula passes sold in June, 1984	New fare structure well accepted by passengers - The number of carrier specific monthly passes was reduced - No change in subsidy was required - Transit ridership has increased - Revenue/cost ratios have increased
replaced by a ional be expended to ngle ride tion of 5 is planned of paying for g implemented	Plan to reduce time limit on tickets and thereby increase fare revenue	Joint AC Transit/BART/MUNI pass program being considered, but financial impact on subsidy requirements may preclude its implementation	MTDB wants to expand success of Ready Pass program by introducing pre-paid multi-ride tickets into the bus operations - Demonstrations of magnetic card readers and multi-ride ticket cancellors on board buses are planned

London

Despite the fact that the vast majority of public transit services have been under the control of a single operator (London Transport - LT) for decades, the bus and underground services were operated with different fare structures which did not provide for intermodal transferring without payment of a full second fare. Each mode sold separate period passes.

The changes in fare structure brought about in May, 1983 represent the most radical adjustment of fares in the history of LT. The bus fare structure was modified from a complex fare stage system (where the fare was computed on the basis of 0.6 to 0.8 km distance increments or "fare stages") to a coarse radial zone system comprising only 3 zones centred on the City of London. Travel within each zone is charged on a flat fare basis. The radial zones are segmented to create additional zones for circumferential travel.

The underground fare was modified from a distance basis (where the fare between stations was computed on a distance formula) to a radial zone system comprising 5 zones within the Greater London area. The first two inner zones, comprising the central area and the limits of the City of London, respectively, are identical for the bus and the underground systems. The large, third suburban bus zone is subdivided into three zones for the rail service, since rail trips tend to be longer and a fare which is graduated by distance was required.

The Travelcard was introduced at the same time. This period pass is available in weekly, monthly, quarterly and annual denominations, providing unlimited riding on both bus and underground modes within the zonal limits of the pass and within the designated time period.

Introduction of the Travelcards increased pass purchases by 30% (over previous single mode pass purchases) and increased travel by passholders by 60%. Because bus and underground fares to Central London were equalized (where previously the underground fares had been more expensive), there has been a major modal shift to the underground for trips to Central London - a major objective in the fare structure change.

LT considers the first stage of implementing full fare integration has been a success. The objectives of introducing a simpler fare structure which provides for convenient intermodal transfers and which encourages the use of the underground over bus travel to Central London has been achieved. Increased efficiency through reduced fare administration costs, the opportunity to move to one man bus operations, and reduced fraud are also claimed as benefits of the new fare system.

Daily Travelcards are planned as are single integrated fare tickets using a combination of magnetic (to open turnstiles in the underground) and visually imprinted tickets (for the bus operations).

Tyne & Wear

The Tyne & Wear Passenger Transport Executive (PTE) is one of several agencies set up in Britain to assume full responsibility for the planning, administration and operation of public transportation in urban regions. It operates both bus and light rail services and contracts for bus and rail services from bus companies and British Rail respectively.

The introduction of the new light rail system (Metro) was the catalyst that brought about the rationalization and integration of the fare structure in the region. Prior conditions included a variety of fare structures, and the inability of passengers to conveniently transfer between modes. Service and fare integration between feeder bus services and the Metro were of paramount concern.

Another aspect of fare integration which is worth noting is that it was implemented within specified revenue targets, since the Central Government indicated that its operating subsidies following the opening of the Metro would be fixed with no annual non-inflationary increases.

A hexagonal or honeycomb zone system was set up with each zone being approximately 5 km across. Four types of fares are sold:

- stage fares for bus trips of up to 5 km in length - the Tyne & Wear PTE was very concerned about a fare system which was properly graduated according to trip distance, since 70% of its passengers travel less than 5 km. The resulting single ride bus fares range from 14p (25¢) to a maximum of 70p ($1.15);
- single ride interzonal fares with no transferring privileges;
- single ride "Transfares" which provide for intermodal transferring. These tickets are time limited;
- period passes or "Traveltickets" which are issued in weekly, four weekly and annual denominations.

The PTE is responsible for the operating costs of all its carriers and it retains all fare revenue.

Despite an average fare increase of 30% at the time of implementation, ridership has grown steadily, due in part to implementation of the Metro service, but also probably due to the attractiveness and simplicity of the new fare structure. The PTE is quite satisfied with this most ambitious program which represents the first major full fare integration implementation in Britain. Future plans to improve on bus magnetic/visual ticket issuing capability are being considered and there are also plans to introduce multi-ride tickets.

Netherlands

Interface problems and inefficiencies caused by closed door operations between suburban and urban public transit carriers were the principal reasons the Central Government in the Netherlands became deeply involved in the provision of public transit service. In the Netherlands the Central Government was the logical governmental unit to become involved, since it holds most of the taxing powers in the country.

Initially the Central Government's objectives were to rationalize and integrate a large number of suburban and urban carriers operating through and outside the major cities. This resulted in an integrated service where suburban carriers provided both urban and suburban services and the routes and services of the urban carriers were rationalized accordingly. While this initial step resulted in more efficient service, there were a variety of different ticketing systems and fare structures which created great confusion for the operators and the passengers.

The next step in the process was to rationalize the fare structure in a way which would greatly simplify the existing arrangements and would increase the flexibility of use by passengers, such that tickets purchased in one area of the country could be used directly in another area.

To achieve these objectives the Central Government took financial responsibility for urban, suburban and intercity public transit systems and molded them into a uniform fare structure and ticketing system. This was accomplished without a great deal of discussion between the Central Government and the carriers.

The entire country has been subdivided into a zone structure with zone dimensions of approximately 4 to 4 1/2 kilometres. The entire system comprises 2,800 zones throughout the country. Off-vehicle fare purchases are encouraged by a fare structure which penalizes on-vehicle purchases. The principal fare medium is a Strippenkaart or multi-ride ticket, with each strip on the ticket valued at one zone of travel. Weekly, monthly and annual period passes are also available, but these are less flexible than the Strippenkaart, since they are for travel within a specified area according to the number of zones of travel which have been purchased.

While the system was readily accepted by passengers, it has the major drawback of not being able to produce ridership information by carrier and route, due to the universal nature of the Strippenkaart. While fare administration costs have decreased, the subsidy system does not encourage operator efficiency. A development program is underway which will provide a replacement for the Strippenkaart in the form of a stored value magnetic ticket that will be both read and imprinted on board vehicles. This will provide the basis for capturing passenger data and thereby for assessing route and carrier financial performance. In addition, more responsibility for efficient operation is going to be passed back to the carriers from the Central Government, but it will not be possible to do this until a good basis for collecting passenger and financial information is available.

Rhine-Ruhr

Construction of a rail rapid transit network linking the main centres of this multi-centred region, a wide variety of fare structures and fare media, and the inability for passengers to conveniently transfer between carriers were the primary reasons for implementing a transit union in the Rhine-Ruhr. The corporate agency resulting from this union is known as the VRR and it is the largest of its type in Germany. It provides the administrative, planning and financial structure for 20 public transit carriers including the Germany Federal Railway (DB).

The structure of the agency and its operating mandate were developed by a task force of carrier representatives and sponsoring government agencies. An integral part of the system rationalization which resulted from the VRR was a rationalization of the fare structure into a honeycomb zone system with a zone size of 6 to 7 km. Single and multi-ride tickets, and weekly and monthly period passes are available for multi-zone trips including transfers between carriers. This is complemented by a stage fare for very short trips.

Fare revenues are collected by individual carriers and are reported to the VRR who reimburse each carrier for the difference between their revenue and costs, with the costs calculated on a standard formula that takes into account the type of service being provided.

Passengers readily accepted the new system because it provided a simpler and more understandable fare structure as well as the ability to transfer between carriers without a financial penalty. The fare structure was carefully tailored so that no passengers would experience a significant increase in fares compared with the previous structure. Because the VRR provides cost reimbursement, the carriers also readily accepted the new scheme. The VRR plans to accelerate the sale of ticket media through vending machines to further reduce their fare administration costs.

Munich

Unlike the multi-centred Rhine-Ruhr region, the Munich region is centred on the City of Munich. Like the Rhine-Ruhr region, motivation for the formation of the Munich Transit Union (MVV) was to integrate public transit services into a regional network, including an integrated fare system.

The resulting fare structure is based on concentric zones with the City of Munich as the centre. The concentric zones are segmented to provide an equitable fare structure for non-radial trips. Stage fares are provided for short distance trips. Multi-ride strip tickets, similar to those used in the Netherlands, are available in addition to single ride fares. Weekly and monthly period passes are also available.

Unlike the Rhine-Ruhr union, the MVV is not responsible for the operating costs of its member carriers. Fare revenue accrues to the MVV and is distributed to the operating agencies based on a formula which takes into account the amount and type of service provided.

The MVV includes participation by the major public carriers as well as by 40 private bus operators who provide service to the suburban communities under contract.

Since implementation of the integration measures, the MVV has been able to achieve significant improvements in financial performance, productivity and ridership (despite major fare increases).

Paris

The main instrument of fare integration in the Paris Region has been the "Carte Orange", a period pass providing unlimited travel within a five zone radial structure, with the City of Paris as the central zone. Passengers can purchase a pass for travel between two or more of these zones in weekly, monthly and annual demoninations. The very substantial discounts offered for the Carte Orange have attracted its use by 60% of all public transit trips in the Paris Region.

Before the introduction of the Carte Orange, transfers between the major carriers (RATP, SNCF, and APTR) were not possible without the payment of an additional fare and different fare structures were in effect so that, depending on the routes chosen, different fares existed for the same trip.

The central agency for the coordination of public transit services within the Paris Region (STP) was set up by the Central Government. The STP managed the implementation of the Carte Orange program. The Central Government has played a very strong role in the planning, managing and financing of public transit in the Paris Region for many years.

The user revenue loss resulting from the Carte Orange program has been made up by an Employment Tax of 2% (in Paris) and 1.2% (in the suburban communities).

Perth

The Metropolitan Perth Passenger Trust (MTT) owns and operates the bus and ferry services and contracts for the provision of rail passenger services within its area of jurisdiction - a very large region containing 1 million population. Fare integration was implemented to improve passenger convenience and to provide an equitable fare structure which graduates the fare according to distance travelled.

The MTT, in addition to operating responsibilities, has policy and planning responsibilities and authority. It is an agency of the State Government.

The fare structure is based on a radial zone system centred on the City of Perth. Since initial implementation, this zone structure has been refined, so that the individual radial zones are now approximately 7 km in width. A two hour time limit on single ride tickets has resulted in passenger abuse, since they may be used for a return trip if the total trip is made within the two hour time limit. The MTT plans to reduce the time limit on these tickets and thereby recover lost revenue.

San Francisco Bay Area

The San Francisco Bay Area is distinguished by the large number of agencies involved in planning, coordinating and funding public transit services. The lead role in system and fare integration has been taken by the Metropolitan Transportation Commission (MTC) which is responsible for the administration of some key subsidy money.

A variety of different fare structures and fare collection systems are in effect which create impediments to fare integration on a regional scale. Partly as a result of this and as well the very significant problem of reaching agreement amongst all of the participating funding, administration and operating agencies, only modest progress has been achieved towards fare integration. Two carriers have a joint monthly pass at a small reduction over the cost of the two separate passes. One carrier (MUNI) has underwritten the cost of providing access to the BART system within San Francisco. The most popular pass program to date has been on the CalTrain Peninsula Commuter Rail System where for an additional cost of $10.00 local transit transfers are permitted to and from the

CalTrain stations. Plans are being considered for other joint passes but there are major financial and technological problems to be overcome and these may preclude implementation.

San Diego

In a similar political setting vis-a-vis financing, operating and administration of public transit as the San Francisco Bay Area, the Metropolitan Transit Development Board (MTDB) has been able to achieve a more comprehensive level of fare integration, comprising intermodal transfers and a regional monthly pass.

Fixed route bus services are operated on a flat fare cash basis with prices varying according to the type of service provided in three categories: local/feeder service, urban service (short to intermediate distance trips), and metro service (long distance trips). The only exception to this fare structure applies to the San Diego Trolley which has a zone fare structure. Transfers from a higher level of service to a lower level (eg. from a metro to an urban service) are permitted free and in the reverse direction the rider must pay the difference between the two fares. The Regional Ready Pass Program provides unlimited monthly travel amongst all fixed route bus and trolley services operating within the MTDB service area.

The MTDB is not directly responsible for deficit funding, however it uses its subsidy powers to enforce minimum financial performance requirements. In addition, it distributes monthly pass revenues according to passenger use counts which must be submitted by each carrier.

These steps towards full fare integration have been well accepted by passengers and they have the effect of integrating the various carriers into a regional public transit system. As a result of these moves transit ridership has increased since fare integration was implemented.

MTB has plans to introduce multi-ride tickets as a means of extending the success already achieved. Demonstration of magnetic card readers and multi-ride ticket cancellers on board buses are planned.

SUMMARY OF FINDINGS

A number of findings from this survey are worth highlighting in terms of the perception of fare integration problems in the Toronto Region and the experience of other jurisdictions in dealing with these problems.

Fare integration was most often accompanied by some form of service integration and rationalization with the dual objectives of improving efficiency and passenger convenience treated as equally important. While increased passenger convenience was a prominent objective in all cases, as far as we were able to determine passenger complaints did not initiate the process of change. Instead the responsible agencies recognized the problems and took the necessary steps to solve them before conditions reached a stage where widespread passenger complaints were an issue. In several instances major service revisions were instituted along with fare integration, resulting in reductions in operating costs. Integrated services and fares resulted in increased public transit ridership.

Equity was considered to be a major factor in establishing the fare structure, with equity being interpreted as meaning a fare cost which reflects the quality and cost of providing the services. Higher cost services such as rail rapid transit often carry a fare surcharge, but instances where surface bus services are costly to provide (eg. Central London) this surcharge has been removed. Short distance trips have been of particular concern to a number of jurisdictions. A relatively common zone structure has emerged from this analysis, with a zone size of approximately 5 km being preferred. Many of the jurisdictions reported that a high percentage of their passengers travel less than 5 km and they have adopted a stage fare basis for these shorter trips. This is particularly relevant to the Toronto Region where most transit systems operate on a flat fare basis effectively resulting in a cross-subsidy of longer trip passengers by shorter trip passengers. Even GO Transit, which has a distance graduated fare structure, has a very high minimum fare which essentially discourages short distance travel.

The experience represented in the survey involved radical and complex changes to the fare structure and the fare collection systems in most jurisdictions. In all cases, it was reported that the passengers readily adapted to the new system with a minimum amount of inconvenience and concern. Since virtually all of the changes had passenger convenience as an important objective, it can be concluded that this objective was achieved in virtually all cases. While most jurisdictions surveyed employed proof-of-payment fare systems involving on-board ticket inspection, Paris uses a mixture of on-board (suburban) and magnetic turnstile systems (within the City of Paris) on their regional rail rapid transit system.

As demonstrated in the Tyne & Wear experience, a fare structure change does not necessarily mean a reduction in fare revenue. In this instance, the fare structure change was accompanied by an overall 30% fare increase and individual trip increases ranging from 0 to 60%. Because it was also accompanied by a simpler and more easily understood fare structure and because it provided flexibility to the passengers who require inter-modal transfers, the resulting changes were readily accepted and ridership has grown steadily since the implementation of the changes.

The London experience clearly indicates that travel mode share can be influenced by fare policies. Even in the inelastic market of travel to Central London, major fare changes produced surprising shifts between public transit and the automobile and between the underground and bus modes.

Finally, the implementing agencies surveyed represented a wide range of responsibility and authority and it can be stated as a general conclusion that as responsibility and authority decreased so did the results of their efforts. As an example of the two ends of this range, the

Central Government of the Netherlands implemented a very radical and monumental change in the fare structure and fare collection system throughout the entire country because it had the full financial and policy authority to do so. On the other end of the scale, the MTC in the San Francisco Bay Area only has certain coordinating responsibilities and controls certain operating subsidies. This undoubtedly limited its achievements in encouraging regional fare integration. A number of examples surveyed, however, showed that with cooperative efforts between the various affected parties, major and important results could still be obtained. The two German examples, in the Rhine-Ruhr and Munich regions respectively, point out achievements which were obtained through cooperative consensus amongst a variety of parties with different objectives. The common objectives of all parties however was to increase passenger convenience, efficiency of service and overall productivity of the public transportation system. With these three base objectives they found that they could design and implement major modifications to the service plan, fare structure and fare collection system which would be of general benefit to all participants.

2. LONDON

BACKGROUND

Public transportation within the Greater London Area is provided by London Transport (underground and bus) and British Rail (surface commuter rail). The Greater London Area contains a population of 6.7 million and covers a geographic area of about 1,600 square km (650 square miles).

Since 1979 London Transport (LT) has been the responsibility of the Greater London Council (GLC), the elected government for Metropolitan London. The GLC is responsible only for those services which require unified administration and control throughout the entire Metropolitan Area (including public transportation), while the 32 London Boroughs are responsible for local services. Central government intends to abolish the GLC in 1986 and in anticipation of this, London Regional Transport (LRT) was placed under the control of the Department of Transport in July, 1984. LRT is a holding company for the operating subsidiaries which run the bus and underground services.

Since 1969 LT's capital expenditures have been financed almost exclusively from capital grants, primarily from the central government, with some contribution from the GLC.

In 1978 LT's operating income included fares (72%), other business revenue (2%), grants from the GLC (26%) and direct grants from the central government (1%). The GLC grant total is funded from realty taxes and partly from the central government's transportation supplementary grant, a block grant for transportation to the GLC (including funds for public transit, streets and highways). The grant from the GLC is for the following purposes:

- fare relief;
- capital expenditures approved by the GLC;
- depreciation and renewal.

During the period 1970 to 1983 LT was beset by a number of chaotic fare changes which significantly affected it attractiveness as a public transportation service. During the 1970s spiralling costs resulted in reduced services, fewer passengers and high fares. This in turn was followed by several drastic fare policy revisions as discussed below.

In late 1977 the GLC indicated its intention to reduce its fare relief operating subsidies to LT from its 1977 level of nearly £63 million to £28 million (in constant 1977) by 1980. The goal of the GLC was to eliminate all operating subsidy to LT and ultimately to finance all operating expenditures out of fare receipts. At the same time, the GLC directed LT not to increase fares in excess of the prevailing level of inflation or without a significant reduction of service, so that the resultant gap between revenue and expenses was to be met by economies in operating costs and increases in productivity supported by capital investment.

The GLC clearly indicated that the riding public finance a higher percentage of system costs than in the past. LT argued that the scope for efficiency increases are quite limited. The primary means of achieving these increases then is through reducing personnel and service.

In spite of an increase in automobile ownership in Greater London, public transportation continues to account for the largest proportion (nearly 82% in 1977) of journeys to work in Central London. Total LT annual ridership, however, declined from a level of 2.4 billion in 1968 to 1.9 billion in 1978. The decline was greater in bus ridership (432 million) than on the underground (82 million).

The 1970's witnessed spiralling costs, declining services, fewer passengers and high fares. In October, 1981 the GLC cut fares across the board by 33%, in a bid to bring people back to the public transit system. The scheme was short lived. The lower fares brought more passengers but the exercise ended in an expensive legal tussle with local boroughs objecting to the tax increases necessary to pay for the lower fares. The court ruled that the cheap fares policy was illegal.

In March, 1982, LT fares doubled, making London's public transportation the most expensive in the world. This in turn was followed by a less dramatic fare cut and the restructuring of LT into zones, which was introduced in May, 1983. The Travelcard is a product of this latest major fare policy revision and represents a period pass that can be used on buses and the underground, but not on British Rail.

In 1983 LT introduced proposals to GLC to modernize the fare collection system. Five key aims were behind the LT strategy:

- to provide better access to the underground by cutting the time taken for passengers to obtain tickets;
- to reduce the cost of issuing and collecting tickets;
- to update ticketing methods and improve security for staff;
- to facilitate fares integration with buses and British Rail;
- to reduce fraud.

The proposal includes a composite arrangement of open (without turnstiles) stations in the outlying area and gated (with turnstiles) stations in the central area. Automatic turnstiles would be installed in stages in the central area and roving inspectors would check tickets on the trains in the outlying areas and subject fare evaders to an on-the-spot fine. The fare collection hardware would include:

- reversible gates opening only when a valid ticket has been inserted and verified;
- self-service ticket machines able to issue any type of underground ticket that does not require proof of a purchaser's status (for example an elderly person's travel permit); this type of machine can accept coins and notes;
- booking office machines able to issue any type of ticket from blank rolls of paper, including through tickets to BR destinations;
- local (installation) and supervisory (central) computers for monitoring and financial accounting.

These proposals are currently under discussion and have not been authorized for implementation at the time of writing this report.

CONDITIONS PRIOR TO FARE INTEGRATION

As indicated in the previous section of this report, LT experienced radical changes in the fare structure between May, 1981 and May, 1983. Following a trend downward in the real (uninflated) price of underground and bus fares from 1972 to 1975, the following six years resulted in continual real increases in fares, such that at the end of 1980, real bus fares had risen by over 30% and underground fares by almost 50%, compared with the beginning of 1972.

At this time (the end of 1980) the LT underground had a distance based fare, with the single adult fare ranging from 20p (36¢ Canadian) for a 1.6 km trip to 260p ($4.70) for a trip 56 km and greater. The cost for journeys within the inner zone of London were surcharged by one-third for fare computation purposes. Buses were operated on a stage fare basis with stage lengths of 0.6 to 0.8 km and adult single fares ranging from 12p for one stage to a maximum of 70p for 11 or more stages.

In a move to simplify fares policy and to encourage one man bus operations, LT conducted an experiment in two suburban boroughs during 1980 which demonstrated that flat fares could increase passengers and passenger mileage without loss of fare receipts. This led to a suburban-wide fare zone scheme which was introduced on London Transport buses in April, 1981.

The success of these initial fare zone experiments provided the impetus for a more general movement toward fares simplification (the replacement of graduated fare scales with fare zones) and the integration of ticketing throughout the London Transport bus and underground networks.

Prior to fare integration, passenger travel on public transportation in the GLC annually was as follows:

- bus (LT) 1,200 million;
- underground (LT) 600 million;
- rail (BR) 200 million.

The major issues which were addressed in fare integration include the inequity of the fare taper on the fares by distance schemes and the inability of passengers to take multi-modal journeys without separate fares for each carrier. In addition, there was a general desire to divert LT bus passengers to rail, because of the congested surface traffic conditions in the Greater London Area.

OBJECTIVES OF FARE INTEGRATION

The following section of this report discusses the manner in which integrated fares were implemented in the GLC. This involved a staged implementation to a zonal charging structure and Travelcards (period passes) which provided for integrated bus and underground travel. These measures were designed to achieve the following objectives:

- commercial
  - simpler, more marketable fares offering the passenger better value for money and the opportunity to make maximum use of the services provided;
  - integrated charging (with Travelcards) to abolish the fares penalty experienced when interchanging between the modes;
- operational
  - encouragement of passengers to use the mode that suits them best without switching according to the relative price of bus and rail;
  - particularly to encourage use of rail for travel to Central London to relieve pressures on high cost surface bus services;
  - to promote efficient operation of driver-only buses both through fares which are simpler to pay and through more off-bus sales in the form of Travelcards;
  - to increase the use of passenger operated ticket machines at rail stations, reducing booking office queues, reducing the number of transactions through increased pass use, all leading to cost savings;
- administration
  - cost savings through simpler compilation of fare charts, fare tables, etc., less need for "special" rates;
- fraud
  - simplifying the structure to reduce the opportunities for fraud, and to make it less worthwhile and easier to detect.

IMPLEMENTATION OF FARE INTEGRATION

To date fare integration has only included only one operator (LT), however it is expected that in 1985 it will be expanded to include BR. The staged process of fare integration was as follows:

- April, 1981 - the suburban bus "flat fare" zone was established, involving a flat fare of 25p (45¢) over a very large bus outer zone;
- October, 1981 - bus zone fares were extended throughout the GLC and introduced to two underground zones in Central London (West End and City). This coincided with an overall substantial reduction in fares which averaged 32%;
- March, 1982 - due to a legal challenge to the GLC which was upheld, a doubling of fares, from their October, 1981 level occurred, but the bus zone fare structure and the two zones for travel by underground in Central London were maintained;
- May, 1983 - zonal fares were established throughout London on the underground, with five charging zones that were on a comparable basis to those on the bus system. The outer, suburban bus zone, was split into three zones for underground charging purposes, to maintain an increasing scale of price for longer distance underground commuter trips to Central London, while retaining the simplicity of one outer suburban zone for bus operation. The West End and City zones were merged into a single central zone. Travelcards replaced underground period passes and most bus passes and are interchangeable between bus and rail for travel within the zones of their validity. On average, fares were reduced by 25% over the March, 1982 fare structure. The most significant reductions were for long distance trips where fares were reduced from 40% to 45%, whereas short distance trip fares were relatively unchanged. This was to compensate for disproportionate increases on longer distance fares that were implemented in the March, 1982 price changes.

LT was the agency involved in implementing fare changes, under the direction of the GLC. It was a response both to substantial reductions in passengers and revenue resulting from the major fare increases in March, 1982 and was also a move to simplify and integrate the overall fare structure in the Greater London Area.

Since integrated tickets are all inspected manually, on both the bus and rail systems, no special procedures or fare collection equipment were required to implement the fare integration scheme. Proposals have been developed to introduce ticket vending and ticket accepting turnstiles in the central London underground stations but these have not been approved for implementation.

The implementation of fare integration over the two year period was considered the most radical change in fare structure in London Transport's history.

CHARACTERISTICS OF FARE INTEGRATION

The current fare structure is described in detail in Appendix B. For travel within the first three zones the bus and rail fares are comparable, except the single adult fare for three zones of travel is 80p ($1.45) on the underground and 70p ($1.25) on the bus system, this latter fare representing the maximum bus fare, while the rail fare increases to 130p ($2.35) for five zones of travel.

Major emphasis in the marketing campaign has been put on the Travelcard which offers interchangeable travel on bus and underground services. It is available for four different time periods as follows:

- weekly, based on a multiplier of 9.2 to 9.4 times the single fare value for most zones;
- monthly, based on a price multiple of 36 times the single fare;
- quarterly, based on a multiple of 102 to 103 times the single fare, or 2.9 times the monthly fare; and
- annually, based on a multiplier of 380 times the single ride fare or 10.6/3.7 times the monthly/quarterly fare.

The Travelcards are therefore attractive to only frequent users of the public transit system. The quarterly and annual card can be seen as a convenience rather than a substantial money saver over the monthly card. Also, the convenience of a Travelcard for multi-modal journeys involving both bus and rail services is an important feature in its attractiveness to passengers.

The proportion of travel on each mode, measured in passenger miles, is used to apportion Travelcard revenue between LT's bus and underground services. Surveys of use are the means by which passenger miles are estimated for each mode.

FARE INTEGRATION IMPACTS

As mentioned in the previous section of this report, fare integration was introduced at the same time as average fares were reduced by 25%. Some fares were reduced much more than 25% while others were not reduced at all, with the bias towards substantial reductions for longer trip distances.

The change in fare structure and the introduction of Travelcards for intermodal transportation has been regarded as a major success, with passengers responding very positively to the new Travelcards which provide a much wider modal availability than the period passes they replaced.

Sale of period passes has increased from just under 450,000 before the Travelcard was introduced to nearly 600,000 by the end of 1983, an increase of about 30%. With the wider opportunities offered by Travelcards, total trips made by period pass holders increased by substantially more (about 60%). Changes in their characteristics included:

- changes in previous bus pass holder's trip making followed introduction of the Travelcard which provided the ability to travel on the rail systems as well. Approximately 25% of ex-bus pass holders and 30% of their bus pass miles appear to have transfered to the underground. This substantial switching of bus pass holders peak line haul journeys to the underground formed a key element in the long term strategy behind the fares changes;

- the growth in bus use by former underground period pass holders, up from 3 to nearly 5 bus trips per week. This increased use by bus for feeder and off-peak trips more than offset losses in bus peak journeys to the underground.

In total, trips made by period pass holders have increased by 60%, coming from a 45% increase in travel on the underground and 70% on bus.

In contrast the fare structure change has caused a reduction in single-ticket use by 6% on bus and 5% on rail.

Due to the significant restructuring of the rail fares in May 1983, it has been estimated that fraud has been reduced to 3-1/2% of fare revenue, compared with 7% prior to May 1983. This has resulted from a reduction in the incentive and opportunity to defraud, particularly for longer trips. On the bus side, fraud has not been reduced (it remains at about 7% of fare revenue) since no major restructuring of the bus fares took place in May 1983.

Exhibit 2.1 shows the elasticity of traffic by mode entering central London to the LT fare policies, and specifically to the major fare changes that took place in 1981, 1982 and 1983. This shows that the peak market is quite sensitive to fares policy, particularly as between the underground and the automobile modes.

An attempt was made to estimate the social cost benefit balance resulting from the May 1983 fares policy implementation, as follows:

- benefits

- reduced fares paid by	£135 m
- travel benefit associated with generated trips	£ 11 m
- reductions in congestion/accidents etc. on the road system	£ 29 m
	£175 m

EXHIBIT 2.1

PEAK PERIOD TRAFFIC ENTERING CENTRAL LONDON

	YEAR-ON-YEAR CHANGE IN JOURNEYS (Thousand)				
	UNDERGROUND (1)	LT BUS (2)	CAR (3)	CYCLE (4)	BR (5)
1980 base	435	103	184	27	411
1980-81[1]	+28 (+6%)	+2 (+2%)	-11 (-6%)	-1 (04%)	-18 (-4%)
1981-82[2]	-58 (-13%)	-3 (-3%)	+24 (+14%)	+12 (+46%)	-2 (-1%)
1982-83[3]	+43 (+11%)	-5 (-5%)	-17 (-9%)	-5 (-13%)	-8 (-2%)
1980-83	+13 (+3%)	-6 (-6%)	-4 (-2%)	+6 (+22%)	-28 (-7%)

1. Fares on LT reduced by one-third

2. Fares on LT doubled

3. Fares on LT reduced by 25 percent.

- costs

- revenue lost as a result of existing passengers reduced fares	£135 m
- revenue gained as a result of new traffic gain	(£ 60 m)
	£ 75 m

The calculated benefit/cost ratio is therefore 2.3 (175 m/ 75 m), implying benefits to LT passengers and other road users has amounted to 2.30 for each 1 cost in extra subsidy.

CURRENT STATUS

The current plan is to include British Rail Services in the Greater London area in the Travelcard scheme and this is planned for introduction in early 1985. Revenue sharing arrangements for this expanded fare integration have not yet been determined.

The benefits of fare integration have so far been confined primarily to the intensive transit system users whose frequency of use justifies purchase of a period ticket (Travelcard). Methods by which these benefits can be extended to the casual user currently buying non-integrated single-journey bus and underground tickets are being examined; a comprehensive system of one-day Travelcards may form the basis for this, upon evaluations not yet complete. There are likely to be significant equipment implications at this stage and these factors are still being evaluated. As indicated earlier in this report, LT seems to prefer a combined system involving magnetic tickets which are imprinted with all of the relevant ticket information and which are used to access the underground system via turnstiles in the central area and roving inspectors in the outlying sections of the underground as well as on the bus system.

COMMENTARY

A number of comments can be made concerning the applicability of experience with fares restructuring in the Greater London area to the Toronto centred region.

The first comment relates to the ability of passengers to understand and adapt to both a complex fare structure and complex changes in the fare structure which took place over the two year period, May 1981 to May 1983. Even the fares resulting from fare simplification on LT are much more complex than the fare structure in the Toronto Region and therefore concern about making the fare structure more complex to accommodate fare integration in the Toronto Region should be seen in this perspective.

The fare structure in the GLA reflects the quality and cost of service. Single-zone travel in central London is surcharged for both bus and underground services, and longer distance rail trips are also surcharged as compared with parallel bus travel.

Travel mode share can be influenced by fares policy. The public transit modal share of trips to central London is only slightly higher than to the central area of Toronto and the results of the fares policy showed that definite changes can be made in the automobile modal share.

While the fares have been simplified they still follow the basic principle of user payment according to the amount of service consumed (length of trip).

Further planned modifications of the fare structure and fare collection system will be toward increased mechanization of the fare collection process, involving large capital expenditures to implement.

3. TYNE & WEAR

BACKGROUND

With a total population of 1.1 million and an area of 535 square km (209 square mi), the Metropolitan County of Tyne & Wear is the main base of industrial and commercial activity in Northeast England. The City of Newcastle upon Tyne dominates the area.

The once largely self-sufficient localized pattern of housing and employment produced by the traditional industries of coal mining, ship building and heavy engineering, started to break down with the decline of those industries which began in the late 1950's and accelerated sharply during the recent recession. Other contributory factors to the process of change over the years has been the policy of moving people out of congested intercity districts to new low density housing on the periphery of the urban area, and the influence of the private automobile.

Established under the 1968 Transport Act, the policy-making Tyneside Passenger Transport Authority (PTA) and its associated Executive (PTE) were created in 1969, had responsibility for the planning and integration of all local public transportation facilities.

At the same time a land use/transportation study was commissioned to produce a transportation plan and land use recommendations to the turn of the century. After evaluating several fundamentally different strategies, the plan that emerged recommended that top priority be placed on investment in public transportation, in the short term to provide improved mobility and support of industrial restructuring and in the longer term to provide an attractive alternative to the private car. A further study completed in 1971 recommended the adoption of a light rail rapid transit system which would make use of the existing infrastructure of the inner suburban railways and providing a new direct north/south tunnel link across the River Tyne.

A private Act of Parliament was passed in 1973 to authorize construction and to establish Government grants. At a final estimated cost of 280 million, the final section of the light rapid transit was opened in 1983, creating a system 54 km in length with 42 stations.

At the time of its inception the PTE assumed responsibility for fares and service planning in an area which had:

- two subsidiaries of the nationalized bus company, one of which was an amalgam of several smaller companies;
- two municipally-owned bus operators;
- local rail services operated by British Rail.

In 1973 the area of responsibility was increased and a further municipal bus operator was added.

The implementation of the Tyne & Wear Metro focussed attention on the need to develop an integrated fares policy for the entire County, since the Metro would provide the spine around which local buses were to be organized.

CONDITIONS PRIOR TO FARE INTEGRATION

With one exception, the fare structures adopted by the public transportation operators were stage fares (the exception was Sunderland, which had a concentric ring zonal structure on its local services). Fare levels however differed significantly across the area.

Service patterns had developed historically and there was some direct bus-rail competition and a considerable overlap of bus services particularly on the main radial routes into the town centres.

Fares in a particular part of the area were traditionally determined by the dominant operator.

All fares and services were subject to approval through the established licencing procedures. In addition, the municipally owned services were also subject to local political control.

The fare scales were markedly tapered, with 20p purchasing 8.8 km of service and a further 10p purchasing an additional 10 km, the fare per km varying from 5p at 1 km to 1.6p at 18 km. This taper was a source of confusion and some criticism. In order to provide more equitable charging and also to facilitate the introduction of a range of period passes, it was decided to reduce the amount of the taper on longer distance fares.

Approximately 10% of bus passenger journeys are made by the holders of County-wide "Traveltickets". The PTE wished to increase the proportion of passengers who travel on Traveltickets to facilitate off-board fares purchased and to reduce the fare collection requirements on bus and at vending machines in Metro stations.

Three types of service are included in the integrated public transportation network which evolved with the implementation of the Metro; line haul, local and inter-suburban. The first of these comprise the trunk services to and from the urban centres. It is characterized by high frequency and a limited number of stops. In many cases passengers will interchange onto line haul bus and Metro services.

Local services are those which serve local trip purposes and act as feeders to the line haul system often at a number of points. The average passenger trip length on these services will be short in relation to the route length, as the services themselves provide a series of local functions.

Inter-suburban services are designed to provide for most journeys between suburban centres.

Two other forms of public transportation play some part in the total network. Conventional local train services on one route provide a line haul service and a river ferry provides essential network links across the Tyne. Both are part of the integrated public transportation network and must be accommodated in the fares system.

Another consideration in developing the fares policy was to minimize the inconvenience to passengers on inter-modal transfers, which were expected to comprise a significant proportion of total public transportation trips. It was felt that an integrated fares system was essential if the proposed interchange system was to work to the maximum convenience of the passenger.

OBJECTIVES OF FARE INTEGRATION

Five specific objectives were defined for the development of an integrated fares system:

1. The fares system should be sufficiently flexible to allow the present, or any other likely revenue target, to be met. One of the Government conditions of authorizing construction of the Metro was that the ultimate amount of operating subsidy support when the fully integrated system was operating which would qualify for Central Government grant would be £5 million (at 1975 prices).
2. The prior financial penalties for transferring passengers should be substantially removed, with passengers being able to purchase one ticket to cover the whole of a local journey irrespective of the number of changes or the modes of public transport used.
3. Under the new fare system, the fares charged should be "equitable", i.e. "fares should remain broadly related to the distance travelled".
4. It must be possible to provide tickets in the new system using proven equipment and in a manner which does not significantly increase the work load on public transit crews.
5. Interchange tickets, issued on a bus, must be compatible with the Metro system entry gates.

Considering these objectives it was concluded that some form of zonal fare system would be the most appropriate for Tyne & Wear. The number of alternative types of zonal fare structure were evaluated including: concentric rings, geographical zones and a honeycomb pattern. Concentric ring zones were used for the Sunderland Corporation fare zone system in the early 1970's and geographical area zones form the basis of the Merseyside PTE's zonal fare system. Both of these were rejected for Tyne & Wear, the former because of the complex route network and the large number of foci which could be identified, and the latter because of the need to ensure equity in charging.

One of the major disadvantages with a pure zone system which is coarse enough to give a reasonable chance of achieving a substantial amount of through ticketing is that short distance passengers would be penalized almost as heavily as in a flat fare system. These passengers form the bulk of the public transportation market (70% of travel is less than 5 km and one vehicle). Therefore a system which minimized the impact on the shorter distance passengers was required.

Since short journeys involving a transfer were not expected in significant numbers, it was possible to consider offering special fares for short non-transfer journeys. This could either apply across zone boundaries where the problem is most significant, or throughout the network. The network approach was chosen with the zonal system being overlaid on a coarse but conventional stage system for short non-transfer journeys.

Thus, a cellular zonal system was developed in a regular hexagonal (honeycomb) pattern, for the following reasons:

1. The cellular pattern was more appropriate than an annular one for a multi-centred transport network.
2. A regular geometric pattern provided greater equity and allowed simple rules for charging.

3. A hexagonally based system becomes annular when viewed from any specific location and creates no difficulty in determining the number of zones traversed in any given journey.

A range of zone sizes from 4 to 7 km were examined which provided between 55 and 18 zones within the County service area. A zone size of approximately 5 km, resulting in a total of 32 zones, was finally selected as the best compromise, since:

- 5 km zones gave graduations which were approximately the same as those in effect at the higher end of the existing fare scale;
- the 5 km zone pattern fits the geography of the County, with zones centring on each of the major urban centres;
- 5 km was the maximum zone size for which it was possible to devise an attractive scheme for local Traveltickets.

Existing fare stages were also revised so that zone boundaries coincided with fare stages and to reduce the complexity of the existing fare stage system, including standardizing the stage spacing at 1 km.

Thus, fares for short distances (5 stages or less) are charged according to the fare stage system. Stage fares are not valid for transferring passengers. Zone boundaries are stage points and stage fares apply for up to five stages from any point on the network. Any journey which is longer than five stages, or one which involves a passenger transfer, are charged according to the zonal scale. Zonal fare computations are made on a "crow flies distance". The fare between an origin and a destination is valid by any route, provided that the route does not pass through a point to which the fare from the origin is higher than that paid for the ticket.

The River Tyne is a major geographical obstacle to travel in the County and to avoid a situation where the zonal fare would not reflect the true distance travelled, or the costs of providing ferry and tunnel crossings, the River east of Newcastle was designated a zone for purposes of charging.

Intermodal tickets, involving passenger transfers, are referred to as transfer tickets. These tickets are valid anywhere within an area of X zones radius from the zone of origin (where X is the number of zones paid for). This condition on validity is open to abuse, giving freedom to ride within a substantial area if the passenger so chooses. In order to prevent this and also to provide the facility to make a return journey on a single ticket, transfer tickets are valid for transfer within a period from the time of ticket purchase.

A second control on the number of passenger interchanges is provided. Only one Metro ride will be permitted for each transfer ticket.

The reason that tickets are not destination specific is largely an equipment constraint which may be overcome with new generation ticketing equipment in the future.

IMPLEMENTATION OF FARE INTEGRATION

Fare integration in the County was implemented in a two stage process over a fifteen year period, as follows:

- between 1969 and 1977 the primary objective was to establish a common fare scale throughout the area so that the benefits of the subsidy support could be equally distributed. A second objective during this period was to harmonize bus and rail fares where they were different;
- during the 1977 to 1984 period the fare integration was aimed at establishing a fare structure which would allow service integration with through ticketing and which would allow more innovative fares measures, particularly "Traveltickets" to encourage patronage.

A secondary consideration was the need to simplify the fare structure so that self-service fare collection equipment and unmanned Metro stations could be employed.

All changes to the fare structure were implemented against specified revenue targets.

Throughout the process the PTE initiated all the changes. The various operators, including the PTE's direct operations, were consulted on the practical aspects of implementation and carried out the necessary negotiations with operating staff.

There was no opposition to the general concept of fare integration. It took some two to three years for all senior staff to fully appreciate and accept the implications. A similar time span was required to educate local politicians, but there was little outright political opposition.

The main change (to zonal fares) was introduced over night but certain of the special facilities were only brought in later. Single journey through ticketing in particular was brought in, in two phases 18 months apart.

The basic fares structure required no change to ticket equipment, however the introduction of through ticketing, in conjunction with the automatic fare collection equipment in the Metro stations involved equipping the whole bus fleet with new ticket machines.

While the revised fares system can be considered as simply a development of the system previously in operation, to the majority of the people many of the features represented a radical change and in particular the introduction of through ticketing was seen as a major innovation.

CHARACTERISTICS OF FARE INTEGRATION

The division of the total passenger traffic between the four major operators is as follows:

Tyne & Wear PTE - bus and Metro	51.0%
United Automobile Services - bus	48.5%
Northern General Limited - bus	
British Rail - local train	0.5%

The PTE meets agreed costs of operations and is credited with all revenue. The PTE sets fare levels, produces all common fares information for staff and passengers and is responsible for all promotional activities.

The fares incorporated in the current fare system are as follows:

- single fares, not involving a transfer, which are charged on the basis of a stage fare system for trips up to 5 km and a zone fare system for longer trips, with single adult fares ranging from 14p (25¢) to 70p ($1.15);
- trans-fare tickets for travel involving an intermodal trip. These tickets are time and date stamped; the last part of the journey must commence within 90 minutes of the purchase of a ticket. These tickets are purchased from vending machines in Metro stations and on-board most buses;
- Traveltickets, based on the number of zones of travel required. These are issued on an all day and off-peak basis for periods of a week, four weeks and annually. Based on regular commuter travel, two trips per day, five days a week, the Travelticket holders obtain a 32 1/2% discount over the single trip fare for a weekly ticket, 37 1/2% discount for a four weekly ticket and a 44% discount on the basis of an annual Travelticket. Traveltickets account for about 25% of the total ticket revenue and single journey tickets account for a further 50%, with the remainder being trans-fares.

The ticket vending machines in Metro stations issue single journey tickets which are magnetically encoded to operate the Metro entry gates and are over-printed with information including zone of purchase, station of purchase, fare paid, date, time of expiry, class, ticket number and machine number. This information enables the tickets issued from the vending machines to be used as trans-fares on the bus system.

Single journey tickets are printed on normal paper by a ticket issuing machine on the bus. In addition, drivers carry pre-encoded stocks of trans-fare tickets which are over-printed with a validator on the bus, allowing them to be used to transfer to other buses in the system or to the Metro.

More detailed information on the fares policy and ticketing is provided in Appendix C.

FARE INTEGRATION IMPACTS

Passengers have generally accepted the changes involved in the new fare policy and ticketing system, but have been slow to take advantage of some of the convenience features, such as the trans-fare tickets.

Implementation in 1979 was accompanied by an overall 30% fare increase, with individual fare changes increasing from 0 to 60%.

The new fare system has fewer fare values than its predecessor, but a wider variety of period passes (Traveltickets). Transfer ticketing for single journeys was introduced for the first time in 1981. A major impetus for the whole change was the need to integrate bus and Metro services as the new Metro system opened, with a substantial reduction in bus operations and ridership.

Patronage has increased steadily over the period against the trend of decline elsewhere in the United Kingdom. This can be attributed to three elements:

1. Improved service, particularly on the Metro.
2. The fares system, particularly Traveltickets.
3. Stable fare levels following the initial increase.

The change to the fare structure did not directly affect the amount of subsidy or the agreements for cost reimbursement which had been previously reached with the other operators.

CURRENT STATUS OF FARE INTEGRATION

The primary objectives of the fare integration process have been achieved. There is still room for considerable fine tuning on the detail of implementation. In particular, the fare collection system on bus requires attention as it is based on mechanical equipment which is not entirely suitable for current requirements.

Further additions are planned in the form of multi-journey tickets which will complement the current single and Travelticket range.

Longer term developments are currently under review in the light of proposed legislation. The current system does, however, have a considerable degree of flexibility to accommodate changing objectives.

COMMENTARY

A number of factors distinguish the fare integration scheme implemented in Tyne & Wear. The first is that the Tyne & Wear PTE bears all of the cost of providing public transportation services in their service area, so that individual carriers were not exposed to any risk with the radical modification of the fare structure.

Even though the fare structure change was radical and incorporated individual fare increases from 0 to 60%, the changes were made within pre-specified fare revenue targets and there was no loss in system ridership as a result. Clearly the Metro implementation boosted over all public transit ridership, however, the fare structure and the equity of the fare system was also accepted by the passengers.

Fare equity was a major concern in implementation, since a very high proportion of transit rides are under 5 km in length. Thus the stage fare basis for very short trips was retained and as well, the substantial taper on the cost of longer distance trips was decreased, such that the resulting fare more closely approximates a constant relationship with distance travelled.

While the PTE was singly responsible for the decision-making, they spent a considerable amount of time working with other local government agencies to resolve implementation plans and to reach a consensus on the new fare structure.

From the technology stand point, a point of interest is that they adopted a combined magnetic ticket/printed ticket technology which was suitable for both Metro and other public transportation services in the region.

4. NETHERLANDS

BACKGROUND

In the Netherlands, municipalities and the Central Government have responsibilities for public transportation. The Provinces do not at this time have any responsibilities in this area. Nine (the largest) municipalities operate their own municipal transit systems, and approximately another 40 municipalities contract for local public transit service to regional operators or local privately owned operators.

Regional and interurban public transit services are provided by regional bus operators. These companies are licenced to operate within specified geographic regions. While a small number of private companies which operate only one or two routes still prevail, the majority of the regional bus companies are subsidiaries of the Netherlands Railway. Ownership by the national railway dates back to the era of stream tramways and as well the national railway has acquired a number of regional bus operators over the last decade who could not maintain a financially viable operation, so they sold out.

During the 1950's and most of the 1960's, the municipalities paid for the deficits on their local public transit systems. During the last 15 years, farebox revenue as a proportion of total cost has steadily decreased such that it now represents only 35% on the regional bus systems and approximately 25% in the larger municipal transit systems.

In the Netherlands, most taxes are levied by the Central Government. Neither municipalities nor provinces may levy substantial taxes. At the point when it became necessary to subsidize public transportation out of general revenues, it was obvious that the only government that was in a position to do so was the Central Government. All costs net of farebox revenue for both local and regional public transportation are paid for exclusively by the Central Government. In turn the Central Government (Minister of Transport), sets or authorizes all fares.

CONDITIONS PRIOR TO FARE INTEGRATION

Prior to 1976, when the Government took over full financial responsibility for all public transportation services, there were a large number of public transport operators providing local, regional and intercity services. Most of the regional and intercity services operated on a graduated distance based fare system, while most of the urban services operated on a flat fare or zonal system. There were a variety of multiride and period passes available and the general level of fares was subject to considerable variance since several of the municipalities used subsidy as a means of holding down fares. In 1976 government control of fares was only indirect, by means of an overall subsidy.

Historically the local and regional public transport systems were operated totally independent from each other, since the licencing system regulated regional operators on a geographic basis and municipal operators were provided with a monopoly on service within the boundaries of the larger cities. Thus, regional buses operated on a closed door basis for that part of their routes which were within the jurisdiction of the municipal transit operator. This led to wide scale and unnecessary duplication of services.

Due to rising deficits on both the municipal and regional transit systems, which were the sole responsibility of the government to finance following 1976, the government's first initiatives to improve the efficiency of the public transportation system was to remove the restrictions from regional operators within municipal boundaries. This has meant that incoming regional bus routes are considered part of the local transit network and parallel local transit routes have either been abandoned or scaled back. In addition, some municipal routes were extended into the adjacent suburbs. In Amsterdam, Rotterdam and The Hague this practice was extended to the national railways as well to provide for travel between stations within the municipality using local transit tickets.

These moves towards service integration had an undesirable impact in relation to the associated integration of ticketing. Since several operators provided local service within major municipalities there was a need to accept tickets issued by one company on the services of another. In addition, some special "integration fares" had to be developed since it was not always possible to simply combine quite different fare systems. Also, some regional bus carriers had to cope with several local fare systems, which meant a further complication.

The reality of this situation was that a wide range of tickets were valid for travel on certain public transport routes. An assessment of this situation in 1975 revealed that the number of tickets valid for travel by the municipal and regional companies in The Hague was 106 and in Rotterdam there were 163 different valid tickets.

The next step in the process, then, was to also integrate the fares and ticketing system to eliminate the impractical complexity of the resulting fare system.

OBJECTIVES OF FARE INTEGRATION

In addition to the complex ticketing system that resulted from the service integration instituted in municipalities across the country, the government wished to rationalize the fare structure so that the same fares would apply for trips of equal distance throughout the country.

It was realized at the outset that any form of national fare structure rationalization could not include the national railways, with a few exceptions were local travel was permitted within the larger cities. The main reason for this stems from the fact that rail fares are 50-60% higher than comparable bus fares, reflecting the higher quality of service and higher operating cost of this service.

Thus the objectives of the fare rationalization and integration in the Netherlands were:

1. To simplify the ticketing system such that uniform tickets could be available for public transportation service on all local, regional and intercity public transportation carriers, excluding the railways.
2. To create a uniform fare structure such that trips of equal distance would be subject to the same fare regardless of the origin or destination of the trip.

The concept behind these objectives represents a radical departure from the fares policies and experience of any other country and is possible only because all public transport operators are subsidized and the subsidy is administered by a single agency.

IMPLEMENTATION OF FARE INTEGRATION

In early 1979 the Minister of Transport published a White Paper on fares which formed the basis for the fares rationalization and integration throughout the country. The major points in this White Paper were:

- the introduction nation-wide of a fare zone system comprised of zones of an approximate diameter of 4 to 4 1/2 km. A total of about 2,800 zones were required to include all areas of the country receiving public transportation service. These zones were carefully established to maintain rural communities and smaller urban areas within single zones as far as possible. The larger cities of Amsterdam, Rotterdam and The Hague are the only examples where multiple zones are in effect;
- equalization of fares on local and regional public transport services by establishing a uniform zone structure and consistent fare per zone throughout the country;
- introduction of the "Strippenkaart" (Stripticket) on an experimental basis to offer a uniform ticket applicable for any travel throughout the country.

An initial attempt was also to be made to integrate this system with the railways by providing the ability to purchase a local public transport supplement for one, two or three zones of travel in combination with a railway period pass.

While fares rationalization and equalization were the primary objectives of the White Paper, the response in Parliament resulted in strong promotion for the introduction of the Strippenkaart which offered the following advantages:

- flexibility to pay according to distance travelled, a flexibility which traditional multi-ride tickets lack because they are constrained to either fixed origins/destinations or a fixed number of zones of travel;
- the ability to effect the vast majority of fare payment transactions off-board the public transit vehicle;
- the opportunity to do away with period passes and single journey tickets and thereby reduce administrative complexity and costs.

The Strippenkaart has a format similar to a multi-ride ticket, containing up to 15 "strips" each equal to the value of one zone of travel. The card has fold creases after each strip and the process of paying for a journey involves folding the card to allow for enough strips since the last cancellation and cancelling the designated strip in the normal method in a canceller. To accommodate this concept to flat fare systems which are considerably higher than the single zone fare price, the method of computing the number of strips required to pay the fare for a journey is to add to the zones of travel one additional strip. For example, a single zone of travel would require the cancellation of two strips, two zones would require three strips, etc.

There are two fare categories, adult and seniors/child, with the latter being priced at half the cost of the adult fare. To discourage on-board purchases, the purchase of Strippenkaarts off-board enjoy a substantial discount, as follows:

PURCHASE	STRIPS	PRICE ($ Canadian)		PRICE PER STRIP	
Off-Bus	15	5.35	($2.10)	0.35	(14¢)
On-Bus	6	2.85	($1.10)	0.475	(19¢)
On-Bus	10	4.75	($1.85)	0.475	(19¢)

NOTE: The prices in the above table are in Guilders (1 Guilder equals 39¢).

An adult all day ticket in a single zone urban area can be obtained by cancelling all 10 rides on a 10 ride ticket, and a similar all day ticket for the complete national transportation network can be obtained by cancelling 20 rides.

An example of a partially cancelled Strippenkaart is provided in Exhibit 4.1.

CHARACTERISTICS OF FARE INTEGRATION

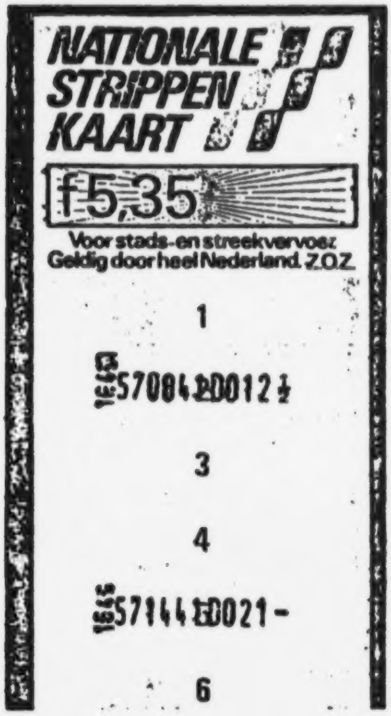
In order to maximize the efficiency on-board the bus, ticket agents across the country were established to sell Strippenkaarts and period passes. An eventual goal of 30,000 agents is targetted, including all post offices, retail stores and offices of the respective public transport carriers. At the present time there are over 8,000 agencies selling the two types of ticket media.

The use of a Strippenkaart is time limited, with the time depending on the number of zones cancelled, as follows:

- o 1 to 2 zones - 1 hour;
- o 3 to 8 zones - 2 hours;
- o 9 plus zones - 3 hours.

EXHIBIT 4.1

PARTIALLY CANCELLED STRIPPENKAART



NATIONALE
STRIPPEN
KAART

f5,35

Voor stads-en streekvervoer
Geldig door heel Nederland. Z.O.Z.

1

1643 570842 0012 ½

3

4

1645 571441 0021 -

6

These time periods have been established so that time will not normally expire before the destination is reached. It is possible using a fast route to make a round trip before expiration of the time.

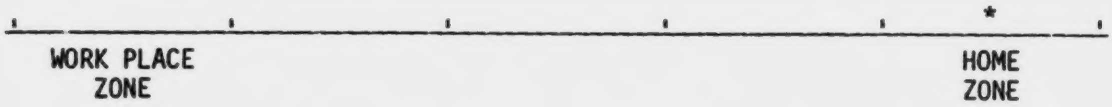
As mentioned earlier in this report, there is only one reduced fare category for children and senior, with children being defined as between the ages of 4 and 9 and seniors 65 and older. This reduced fare is half the normal fare if the fare media is purchased off-board, otherwise full fare is charged for Strippenkaarts sold on the vehicle.

In addition to the Strippenkaarts, there are weekly, monthly and annual period passes. The weekly pass is priced at approximately 11 times the single trip ticket rate, with the monthly pass at approximately 34 times the single trip rate and the annual pass at 10 times the monthly rate. Thus, substantial discounts are available particularly for monthly and annual passes. The passes are sold according to the number of zones of travel required from a selected "central" zone, and are available on a 50% discount to children and seniors. The central zone concept allows travel to all other zones within a range of X zones, where X is the number of zones of travel purchased on the pass. To illustrate, suppose that the pass is purchased to provide transportation from the home zone to the work zone and that the work zone is four zones removed from the home zone. Exhibit 4.2 illustrates the two options available to the purchaser. Under Option A the passenger would pay for five zones of travel and in addition to travel to work the passenger could travel to any other zone within a radius of five zones from the home zone. Alternatively, under Option B, the passenger could buy a three zone pass and select the central zone as the zone midway between the home zone and the work zone, thereby saving money on the cost of a pass but restricting other opportunities for travel on the pass to those which are within two zones of the central zone. Using the 1980 fare table to illustrate the difference in cost, a five zone monthly ticket would cost 72 fl ($28) whereas if the passenger chose Option B or a three zone pass it would cost 48 fl ($18.75), resulting in a substantial savings if the pass was to be used only for home to work travel.

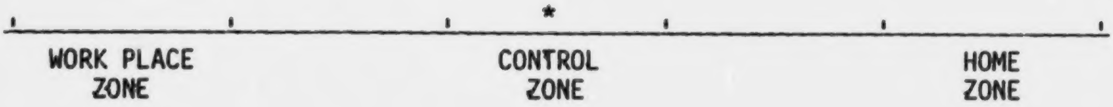
EXHIBIT 4.2

COMPARISON OF OPTIONS FOR NOMINATED ZONE ON PERIOD PASSES

OPTION A


*
WORK PLACE ZONE
HOME ZONE

OPTION B


*
WORK PLACE ZONE
CONTROL ZONE
HOME ZONE

* Indicates the nominated zone of the period pass.

Since the Central Government is responsible for subsidizing all carriers operating under this scheme, the allocation of revenue from fares is not as important as if financial responsibility rested with each carrier. Under the current scheme the fare revenue is distributed to the carriers on the basis of passenger surveys carried out from time to time by the Ministry of Transport.

FARE INTEGRATION IMPACTS

The new fares policy and fare collection system was introduced in two phases. First, the Strippenkaart was introduced on May 7, 1980 and available at off-board locations. During the period from May 7 to October 1, 1980 it was available along with all of the other ticket media that were currently in affect. Also during this period there was a major advertising campaign to acquaint the public with the nature of the changes. On October 1, 1980 all of the old tickets were officially redundant.

While passenger confusion had been anticipated, since none of the old tickets were available any more and new tickets had to be purchased off-board, the actual transition was affected much more smoothly than most people anticipated, with only two or three days required for most of the passengers to accommodate to the changes. Press comments at the outset were quite hostile, however this was soon followed by very strong support based on the overwhelmingly positive reaction of the public to the new system.

The public transport carriers initially reacted quite negatively to the scheme. Some felt it was unworkable and other resented the degree of government interference associated with implementation. It should be pointed out that the government basically decreed the new system and did not offer much opportunity to the carriers to participate in the process for planning its implementation.

One municipality (The Hague) refused to accept the new system since they felt it was their historic right and responsibility to operate and control municipal public transportation. Following the impressive acceptance of the system throughout the country, The Hague fell into line 12 months following implementation in the rest of the country.

Carrier resistance to the system still remains to some extent, but this is primarily related to the availability of tickets in areas where there are insufficient outlets to conveniently serve passenger requirements. This was the prime reason for the pressure to introduce the six strip ticket for sale on-board the bus. Available information suggests that very few passengers, even on the regional bus routes, purchase tickets on-board the bus.

The system has some very strong positive features, but it also has negative aspects. The positive benefits are as follows:

- For the Passenger:
  - availability and ease of use in all areas of the country;
  - flexibility of tickets for use for varying trip lengths and destinations;
  - a reduction in boarding time;
  - a reduction in boarding problems associated with the payment of fare on-board the vehicle.
- Operator:
  - a significant reduction in the cost of fares administration;
  - increased speed of operation as a result of reduced boarding time.
- Government:
  - increased cash flow through increased use of multi-ride prepaid tickets;

- potential increased revenue through increased use as a result of the improved accessibility associated with the new fares system;
- reduced administration costs;
- the availability of equity for the users and the associated positive effects this has on the government.

The negative aspects of the system must also be considered when evaluating its overall impact, and these include:

- a degree of inconvenience to passengers who are required to purchase the Strippenkaart and period passes off-board the vehicles, unless they wish to pay a premium fare. This does not appear to be a major drawback in the system and the opinion of knowledgeable observers seems to indicate that the passengers have adapted quite readily to this aspect of the system;
- the subsidy system does not provide any incentive for the carrier to improve the efficiency of operation, either through tailoring system service to demand or through measures to maximize the fare revenue;
- there is virtually no passenger usage data available for system planning and monitoring since there is no means of determining where the Strippenkaart is actually used and how frequently pass users use the system.

The latter two of these negative aspects are being seriously reviewed, as is discussed in the following section of this report. One further negative aspect is the lack of cooperation of the Netherlands Railway in the system, both because their fares are 50-60% higher than the comparable bus fares, but also because they want to maintain a high degree of autonomy in their operations and do not want major management decisions to be made by the Central Government.

CURRENT STATUS OF FARE INTEGRATION

Bearing in mind the two major drawbacks of the system, the Ministry of Transport has initiated plans to mitigate both problems. The first proposal is to replace the existing paper ticket Strippenkaart with a stored value magnetic ticket. Under this system vehicles would be equipped with cancelling machines capable of magnetically reading and writing on a ticket and printing the remaining value on the ticket for visual inspection. In addition to the remaining value, the date, time and zone in which the value was deducted would be recorded and printed, so that the ticket could be visually inspected. The equipment would be equipped with memory, thereby providing passenger statistics. In addition the magnetic ticket based system would enable a variety of more flexible fares to be introduced such as off-peak fares, special fares in the central areas of cities, etc.

It is the intent also to retain the period passes but to have their use recorded on each trip taken so that data on passenger use of this type of ticket could be captured.

Tickets would still be sold through the post office and other retail and government outlets, but each carrier would be required to analyze and be accountable for the revenue accruing on its routes.

If this system is implemented ultimately 25,000 vehicles would be equipped with the stored value ticket reading/writing machines. The program is currently in the pre-award contract stage. Specifications have been written and two firms have been shortlisted for the development of prototype equipment. Initial field tests on a small number of units will be undertaken prior to contract award. Assuming success, the plan is to introduce the equipment across the entire country sometime in 1986.

Consequent with the introduction of the new equipment, it is planned that a new law will be enacted in 1986 which will make each carrier responsible for its revenue as well as its operating costs. It is hoped that this decentralizing move will provide the necessary stimulus towards increased efficiency in revenue maximization. Revenue responsibility cannot obviously be assigned to carriers unless the magnetic ticket system described above is implemented successfully.

This move toward stored value magnetic tickets will undoubtedly encounter a number of problems. Currently it is anticipated that the vehicle operator will set the value to be deducted from the ticket. This would mean a limit to boarding from the front door only and could significantly increase boarding times. The complexity and reliability of the stored value machines could make some sort of backup a necessity.

One positive potential benefit would be the ability to integrate the system with the railways, since it would be inherently be able to accommodate their higher fares.

COMMENTARY

The national fares system employed in the Netherlands is a unique and radical development in fare policy and fare collection systems. As pointed out in this report, the system offers many very beneficial attributes, particularly to the passenger. In this respect it has been an unqualified success.

The negative aspects of the system have been recognized and there are plans to mitigate these problems however a number of potentially significant technical problems have to be overcome before these objectives of improved information and decentralized responsibility can be achieved.

Another point worth noting is that the Central Government in the Netherlands appears to be much more willing to tolerate a high level of subsidy from general revenues and this is a reflection of their perception of transportation as a social service to the community. This position is in common with several other European countries but also contrast markedly with the policies in effect in Canada.

5. RHINE-RUHR TRANSIT UNION

BACKGROUND

Similar to other large urban regions in Germany, the Rhine-Ruhr Region which contains the main urban population of the State of North Rhine-Westfalia , decided to establish a Traffic Union or Verkehrsverbund on January 1, 1980, known as the VRR (Verkehrsverbund Rhine-Ruhr). A comparison of the Traffic Unions in Germany is provided below.

TRANSPORT ASSOCIATION	YEAR FOUNDED	POPULATION OF REGION IN MILLIONS	ANNUAL PASSENGERS IN MILLIONS (1980)
Hamburg	1965	2.5	436
Munich	1972	2.3	451
Frankfurt	1974	2.4	206
Stuttgart	1977	1.6	216
Rhine-Ruhr	1980	8.0	940

Thus, the Rhine-Ruhr Transit Union is by far the largest of the Germany Public Transportation Associations. The Region is an urban conurbation covering 23 municipalities and 5,000 sq. km.

Public transportation in the Region is provided by 20 public transit agencies, 19 of which are municipal operations and the 20th is the German Federal Railway which operates both intercity trains and regional rail services.

CONDITIONS PRIOR TO FARE INTEGRATION

In 1979, prior to the implementation of fare integration, there were five different fare structures in operation throughout the Region, as follows:

- six carriers operated with stage fares;
- two carriers operated with a flat fare;
- one carrier operated on a distance basis;
- seven carriers operated on "area fares" which correspond to large zones;
- four carriers operated on a more traditional zone fare basis.

The fare media used included single ride tickets issued on-board the vehicles, multi-ride strip tickets and multi-ride tickets requiring validation. The use of automatic vending machines for ticket sales was not very far advanced. Vending machines were available as S. Bahn stations and at major transfer points. The vending machines sold both single and multi-ride tickets.

Exhibit 5.1 lists the carriers and the 1979 and 1980 passenger volumes of each carrier (in millions). As shown in this table, the majority of the carriers are relatively small, with the largest being the Dusseldorf transit system at 142 million passengers in 1979.

One of the principal reasons which led to the formation of the VRR was the construction of the Stadtbahn which is the rapid transit link now in operation between Mulheim and Essen. Ultimately it will be extended to connect Dusseldorf and Dortmund in a network. In addition, because of the economic interdependency of the communities within the Region, there was a considerable amount of transferring between services and carriers, resulting in the payment of multiple fares by transferring passengers. In addition, there were a number of duplicate services developed to serve historic patterns of public transit use.

EXHIBIT 5.1

CARRIER ANNUAL PASSENGER VOLUMES 1979 AND 1980

(In Millions)

Unternehmen	1979	1980
Bochum-Gelsenk. Straßenb. AG	87,2	93,7
Dortmunder Stadtwerke AG	72,1	77,5
Rhein. Bahngesells. AG	141,6	152,2
Duisburger Verkehrsges. AG	40,2	43,3
Verkehrsges. Ennepe-Ruhr mbH	9,2	9,9
Essener Verkehrs-AG	83,8	90,1
Hagener Straßenbahn AG	33,5	36,0
Straßenbahn Herne-C.R. GmbH	10,1	10,8
Vestische Straßenb. GmbH	48,6	52,3
Krefelder Verkehrs-AG	29,3	31,5
Stadtwerke Mönchengladbach	34,4	36,9
Bahnen der Stadt Monheim GmbH	3,4	3,6
Niederrh. Verkehrsbet. AG NIAG	6,7	7,2
Betriebe der Stadt Mülheim	21,0	22,5
Stadtwerke Neuss	22,6	24,3
Stadtwerke Oberhausen AG	22,6	24,3
Stadtwerke Remscheid GmbH	17,6	18,9
Stadtwerke Solingen	21,0	22,5
Viersener Verkehrs-GmbH	4,2	4,5
Wuppertaler Stadtwerke AG	57,8	62,2
Bundesverkehrsunternehmen	71,1	76,6
Summe	838,0	900,8

OBJECTIVES OF FARE INTEGRATION

In addition to the need to accommodate the operation of the Stadtbahn, the following objectives were established for the fare integration system:

- a dismantling of the barriers to the use of more than one carrier;
- a desire to attain uniformity of transportation and tariff regulations in the Region;
- a desire to implement a comprehensible and easily understood set of passenger tariffs;
- uniformity of fare levels;
- a decrease in the number of different period passes;
- rationalization of sales and a reduction of sales expenses related to public transit tickets;
- implementation of uniform guidelines for fare inspection;
- implementation of an easier system of ticket sales for the passenger.

IMPLEMENTATION OF FARE INTEGRATION

The preliminary work in establishing VRR was undertaken by a special task force made up of representatives of each of the carriers operating in the Region. This task force created special working groups in which specific staff representatives of the companies dealt with particular aspects of defining the administrative and operational mechanisms to achieve the established objectives. It should be noted that the individual carriers were eager to cooperate in this development and the formulation of a solution seemed to be relatively straight forward.

The outline structure for the organization which was developed by this group was discussed and agreed to by the participating organizations. General and specific conditions which describe the responsibilities of the Traffic Union were then developed within existing Federal Legislation permitting the establishment of Traffic Unions. The special conditions included the fare structure and the methods by which average costs for each carrier were to be calculated for the purposes of revenue and cost administration. These conditions were then approved by the Government.

The passenger fare structure was set up as a compromise between the existing fare structures and the preferred zone fare system which was the basis for implementation. The cost formula for compensating carriers took into account both operating costs and a return on investment by each carrier.

CHARACTERISTICS OF FARE INTEGRATION

A zone system was developed involving zones which are approximately 6 to 7 km in diameter, resulting in 62 zones covering the entire Region. The fare categories which were established include:

- adult single fares;
- child single fares (under 14 years of age);
- adult multiple ride tickets;
- child multiple ride tickets;
- adult weekly pass;
- adult monthly pass;
- adult monthly renewal pass;
- student monthly pass (for students 14 years of age and over);
- student monthly pass (for students under 14 years of age);

- senior citizen monthly pass;
- senior citizen renewal monthly pass;
- adult 24 hour pass.

The zone boundaries were established to coincide where possible with municipal boundaries, with the larger urban municipalities being divided into more than one zone. In addition, some compromises were made in zone fares to minimize the initial differences between the pre-existing fare structure and the new zone fare structure.

Overall, the fare structure comprises five fare levels, depending on distance travelled. A 62 x 62 matrix is provided to show the fare level that applies for travel between every zone in the matrix. Intrazonal and short distance trips of up to five kilometres are charged at the lowest fare level, currently 1.80 DM (79¢ Canadian) for a single ride adult ticket. The time limit on this ticket is 40 minutes. The highest single ride adult fare is in level 5 at 8.60 DM ($3.80), which has a time limit of 1 1/2 hours. Children single ride tickets cost two-thirds of the adult single ride rate, up to a maximum ticket price of 2.8 DM ($1.25). Weekly and monthly passes are priced at 8 times and 32 times the single ride fare for adults. Reduced senior citizens fares are only available on a monthly pass, which is priced at approximately 22 adult single rides, and represents about a 30% discount on the adult monthly pass.

These fares apply to all carriers except the German Railways which operates the regional rapid transit systems and caters to the long distance trips. Their fares range from DM 9 ($4.00) to DM 22 ($9.70), reflecting both longer distance trips and a higher quality of service resulting in a higher price per kilometre than the local systems.

FARE INTEGRATION IMPACTS

As indicated earlier, implementation of the new fare system was readily understood and accepted by passengers. An intensive public relations campaign was instituted prior to the fare change date (January 1, 1980) and this seemed to be very effective. Complaints were only received where passengers had to pay a higher fare as a result of the new system.

Since the VRR is responsible for reimbursing carriers for their costs, the system seemed to be readily accepted by the carriers.

Accounting and responsibility for fare revenue collection remains the responsibility of the individual carriers, but they must report fare receipts to the VRR who in turn reimburses them the difference between fare receipts and the costs of operation. This method seems to have been readily accepted by the carriers. Exhibit 5.2 indicates the changes in fares for a single ride trip of under five kilometres, from 1979 to the new fare structure in 1980. Most of the passengers for trips of this type experienced a reduction in fare and this is obviously one of the reasons why the passengers readily adapted to the new system.

Exhibit 5.3 shows the relationship between a single ride fare Category 2 (trip over 5 km) as well as weekly and monthly period pass rates for all companies both before and after the fare change. The new fares were equal to or higher than the old fares for this category of rider, although some of this change could probably be attributable to annual inflation. In fact, several of the carriers anticipated the changes and gradually adjusted their fare structure to the new system prior to the implementation date.

Implementation of the new fare system required purchase and modifications to ticket issuing and cancellation equipment. In total this required the purchase of 8,800 validators, 3,900 cancellors and modification to almost 1,200 ticket issuing machines.

The format of the fare media was changed and new identification cards were developed to a uniform standard. In a period of two months, 700,000 new identification cards were issued.

EXHIBIT 5.2

CHANGES IN SINGLE RIDE ADULT FARES FOR SHORT TRIPS (UNDER 5 KM) 1979/1980

Unternehmen	Preis/Einzelfahrausweis in DM, bezogen auf 5 Km Reiseweite	
	1979	1980
Bochum-Gelsenk. Straßenb. AG	2,00	1,50
Dortmunder Stadtwerke AG	1,80	1,50
Rhein. Bahngesellschaft AG	1,50	1,50
Duisburger Verkehrsges. AG	1,75	1,50
Verkehrsges. Ennepe-Ruhr mbH	1,30	1,50
Essener Verkehrs-AG	2,00	1,50
Hagener Straßenbahn AG	1,40	1,50
Straßenbahn Herne-C.-R. GmbH	2,00	1,50
Vestische Straßenbahnen GmbH	2,00	1,50
Krefelder Verkehrs-AG	1,80	1,50
Stadtwerke Mönchengladbach	1,20	1,50
Bahnen der Stadt Monheim GmbH	1,50	1,50
Betriebe der Stadt Mülheim/Ruhr	1,40	1,50
Stadtwerke Neuss	1,20	1,50
Stadtwerke Oberhausen AG	1,50	1,50
Stadtwerke Remscheid GmbH	1,60	1,50
Stadtwerke Solingen	1,20	1,50
Viersener Verkehrs-GmbH	1,20	1,50
Wuppertaler Stadtwerke AG	1,50	1,50
DB-Schiene	1,20	1,50

EXHIBIT 5.3

CHANGES IN FARE STRUCTURE FOR ADULT TRIPS OVER 5 KM 1979/1980

- o SINGLE FARE (TYPICAL)
- o WEEKLY PASS
- o MONTHLY PASS

Unternehmen	1979			1980		
	Einzelfahrausweis/ DM	Wochenkarte DM	Monatskarte DM	Einzelfahrausweis/ DM	Wochenkarte DM	Monatskarte DM
Bochum-Gelsenk. Straßenbahnen AG	2,00	14,00	57,00	2,00	15,00	60,00
Dortmunder Stadtwerke AG	1,80	11,60	47,00	2,00	15,00	60,00
Rheinische Bahngesellschaft AG	1,60	14,00	60,00	2,00	15,00	60,00
Duisburger Verkehrsgesells. AG	1,75	17,00	68,00	2,00	15,00	60,00
Verkehrsgesells. Ennepe-Ruhr mbH	1,90	16,20	58,00	2,00	15,00	60,00
Essener Verkehrs-AG	2,00	14,00	57,00	2,00	15,00	60,00
Hagener Straßenbahn AG	2,00	16,50	66,00	2,00	15,00	60,00
Straßenbahn Herne-C.-R. GmbH	2,00	14,00	57,00	2,00	15,00	60,00
Vestische Straßenbahnen GmbH	2,00	14,00	57,00	2,00	15,00	60,00
Krefelder Verkehrs-AG	1,80	14,00	56,00	2,00	15,00	60,00
Stadtwerke Mönchengladbach GmbH	1,20	10,50	48,00	2,00	15,00	60,00
Bahnen der Stadt Monheim GmbH	1,80	14,00	60,00	2,00	15,00	60,00
Betriebe der Stadt Mülheim a. d. Ruhr	2,00	14,00	57,00	2,00	15,00	60,00
Stadtwerke Neuss	1,20	9,50	38,00	2,00	15,00	60,00
Stadtwerke Oberhausen AG	1,50	11,00	45,00	2,00	15,00	60,00
Stadtwerke Remscheid GmbH	1,60	12,00	75,00 (Netzk.)	2,00	15,00	60,00
Stadtwerke Solingen	1,80	15,90	63,60	2,00	15,00	60,00
Viersener Verkehrs-GmbH	1,20	10,50	48,00	2,00	15,00	60,00
Wuppertaler Stadtwerke AG	2,50	15,00	60,00	2,00	15,00	60,00
DB-Schiene	1,60	10,50	39,00	2,00	15,00	60,00

As the system now works, each carrier is responsible for printing, distribution, sales and accounting of all uniform fare media. The name of each carrier is imprinted on the tickets they sell but this has no validity insofar as accounting is concerned.

Passengers can now transfer between carriers without the need for a transfer or a multiple fare payment.

CURRENT STATUS OF FARE INTEGRATION

The transformation of the individual fare systems to one uniform integrated fare structure has been completed and accepted by all concerned. In specific zones, in order to reduce the financial impact of the change, especially for short trips, compromises were necessary in the pricing system. Because of some special difficulties in the sale of tickets, through ticketing has not been completely implemented yet on the S. Bahn.

Major changes in the ticketing system and fare structure are not expected. Some fine tuning will continue in order to gradually readjust the fares which were corrected to minimize the initial impact of the differences between the new and old fares.

It is expected that in the future more ticket vending will take place through vending machines, to reduce staff costs associated with fare collection.

6. MUNICH

BACKGROUND

Munich follows Berlin and Hamburg as the third largest city in Germany. The City is the capital of the State of Bavaria and has a population of 1,300,000. Another 1,000,000 population resides in the surrounding region which is composed of 170 different municipalities within an area of some 5,000 sq. km. (1,950 sq. mi.). The City of Munich occupies some 320 sq. km. (125 sq. mi.). Exhibit 6.1 shows the region and the Greater Munich Area.

The structure of the region includes of a densely populated central city surrounded by the suburban area of Greater Munich containing in total 1,800,000 population within 1,200 sq. km. (470 sq. mi.), with the remaining 500,000 population in the more rural towns and villages.

Munich is the economic centre of the region and this is reflected by the transportation infrastructure which is primarily radial.

CONDITIONS PRIOR TO FARE INTEGRATION

Prior to May, 1972, the Munich region was served by three principal public transportation carriers which functioned independently of each other:

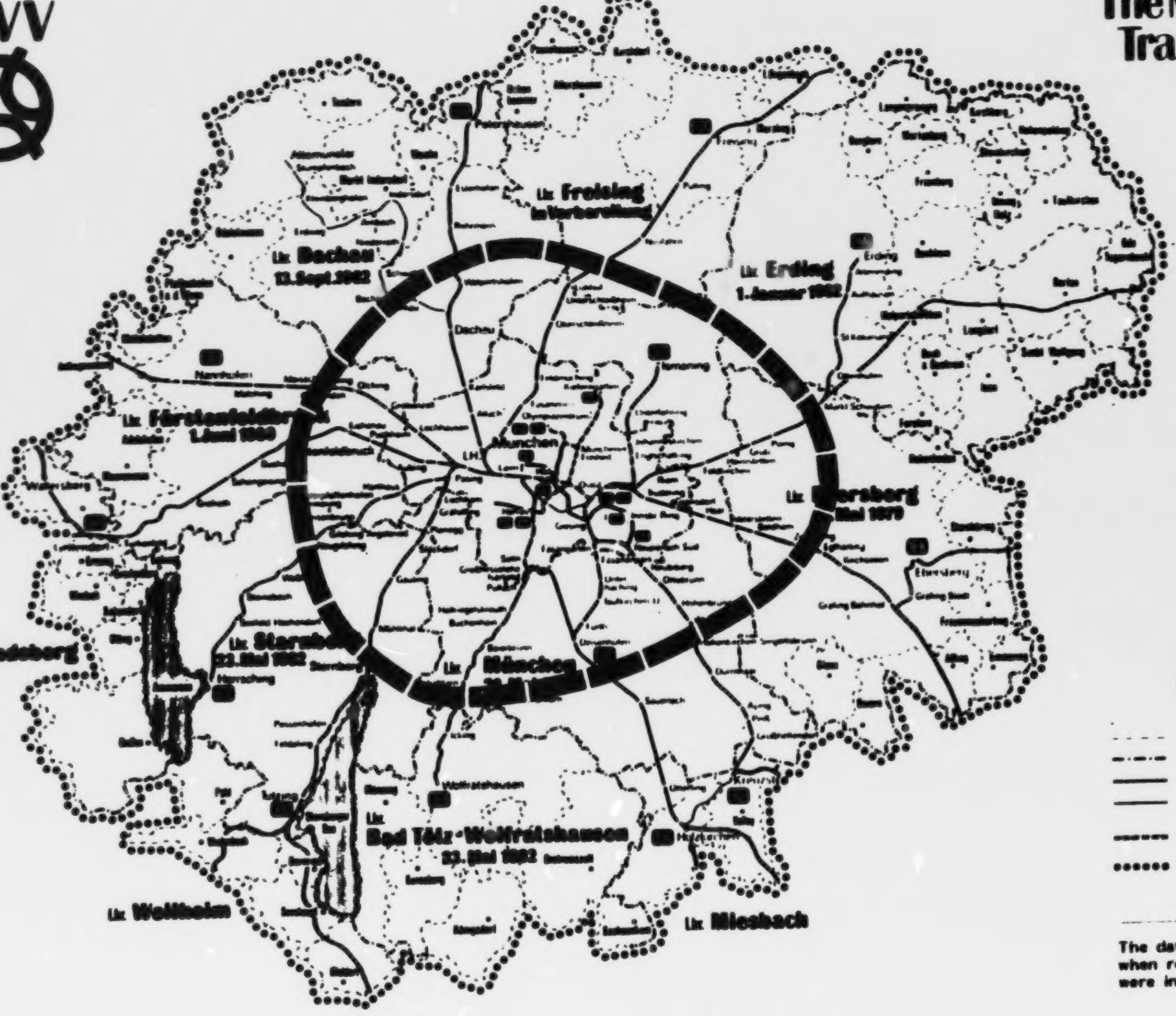
- the Munich Municipal Transportation Authority (SMV) provided tram and bus services. The SMV is part of the Munich Municipal Utility Company, a semi-autonomous public authority which also includes gas, electric and water utility services. Operating deficits of the SMV are paid for out of operating surpluses in the other utilities;
- the German Federal Railroad (DB) which provided regional commuter trains and buses;

THE MVV SERVICE AREA

exhibit 6.1

MVV

The Munich Public Transport Area


Lkr. Freising in Vorbereitung
Lkr. Dachau 13. Sept. 1982
Lkr. Erding 1. Januar 1982
Lkr. Fürstenfeldbruck 1. Juni 1980
München
Lkr. Ebersberg Mai 1979
Lkr. Landsberg
Lkr. Starnberg 23. Mai 1982
Lkr. München
Lkr. Bad Tölz-Wolfratshausen 23. Mai 1982
Lkr. Weilheim
Lkr. Miesbach
N

The dates indicate the time when regional bus services were integrated into MVV.

The Greater Municipal Area

- the German Federal Post Office which also provided regional bus services.

Each of these three independent carriers had its own service network, its own fare schedule and its own timetable. In addition, the eight rural districts within the region were served by a multiplicity of privately owned bus lines operating under contract to the municipalities. Each of these services had its own routes, timetables and fare schedule.

The level of private automobile ownership was growing rapidly both before and after the formation of the Munich Transport Community (Munchener Verkehrs und Tarifverbund-MVV), with a growth of 80% between 1973 and 1977. On a weekday basis, public transportation accounted for approximately 37% of total passenger trips in the region.

S-Bahn (commuter rail) and U-Bahn (urban rail rapid transit) services were also under developed within the City of Munich, with the S-Bahn lines oriented in an east-west direction and the U-Bahn lines in a north-south direction. The main S-Bahn line serves to connect the seven western Federal Railroad lines with the five lines in the east. It is the main connection to the centre of Munich from the centres of the outlying communities. Within the City itself, the S-Bahn also serves as an east-west rapid transit system. The main junction point between the north-south U-Bahn lines and the S-Bahn line in the centre of the City has been transformed into a pedestrian zone.

OBJECTIVES OF FARE INTEGRATION

The formation of a unified transportation system under the direction of the MVV was the primary goal of the participating agencies. The MVV has responsibility for setting overall public transportation policy for the region. The operating companies which are the City of Munich, owner of the SMV (Munich public transportation system), and the DB (German Federal Railway owned by the Federal Government) were the two initial partners in the MVV (it is not clear how the interests of the German Federal Post

Office bus service were initially incorporated in the MVV). The MVV has the following responsibilities:

- achieving an integrated public transportation service;
- establishing an integrated timetable and schedules;
- establishing an integrated fare system and setting fare levels;
- distributing fare revenues between the two partners.

The MVV does not operate any transportation services nor is it responsible for any deficit incurred by the participating partners. The SMV's deficit is the responsibility of the City of Munich, while the deficit of the DB is the responsibility of the Federal Government. The MVV receives no subsidies; its administrative costs are paid for by contributions from fare revenues by the two partners.

The Munich Tunnel Company whose members include the Federal Government, the State of Bavaria, the City of Munich and the German Federal Railways, is responsible for constructing the U-Bahn and S-Bahn systems. The City of Munich is responsible for funding the construction of U-Bahn projects. The Federal Government provides, through the State of Bavaria, 60% of the eligible construction cost of approved U-Bahn projects. The State of Bavaria provides an additional 20%. The federal funds are generated from a portion of the federal gasoline tax set aside for public transportation purposes. About 7% of the total tax is set aside for transportation. Bavaria's contribution is derived from a tax it levies on motor vehicle registration, 9% of the proceeds of which are earmarked for local public transportation. The remaining amount of the construction cost is paid for by the City of Munich. The SMV is responsible for the purchase of rolling stock for the U-Bahn system.

IMPLEMENTATION OF FARE INTEGRATION

The implementation of the MVV was patterned on the model from Hamburg, although the conditions for implementation of a transit union in

Munich were quite different in terms of the structure of the region and the number of carriers affected. Preparatory discussions commenced in 1968 and the MVV was implemented in May, 1972.

When the MVV first started operation, only the Federal Railroad and Federal Post Office bus lines could be incorporated into the system. The Post Office provided about 60% of the regional bus routes. Incorporation of the private bus lines into the MVV was planned from the beginning and after five years of preparatory work a new regional bus network was put in operation in Munich County with the remaining counties joining the system shortly thereafter. The private bus operators, under contract to these municipalities, function as equal partners in the MVV while retaining their commercial independence. With the aid of the State of Bavaria, the counties make a financial contribution to the transportation services in their areas. They determine the services to be offered, establish the timetables, routes and bus stops.

The MVV is legally constituted as a limited liability corporation and functions according to established by-laws. The MVV is governed by three executive bodies:

- a Board of Directors;
- an Administrative Board, comprising representatives of the Federal Government, the State of Bavaria, the City of Munich and the Federal Railroad;
- a Managerial Board, with two equally powerful directors, one selected by the City of Munich and the other by the Federal Railroad.

The Managerial Board presides directly over the Administrative Office, the Press and Public Relations Office, and the Office for Transport Research and Study. The operational tasks of the MVV is organized into four major divisions:

- general public transport planning and the on-going development of the system, including new lines and stations;

- scheduling and operational direction;
- ticket pricing and the organization of ticket sales;
- business management, including the estimation of required investment and profitability, compensation for services rendered and distribution of fare receipts.

The MVV operational objectives included improving connections throughout the entire region, specifically providing better accessibility to the central municipalities of each of the rural districts, and improving accessibility from the surrounding region to Munich.

The over 40 bus firms (mainly private) included in the MVV operate as partners with the two largest operators and have equal rights in the MVV.

In the early years of the MVV operation, smaller urban centres in the region, mostly historically independent centres in their own right, complained that the public transportation structure was designed to serve the City of Munich and that accessibility to these independent centres was being eroded. To respond to these complaints, the MVV established bus lines to serve the rural districts, connecting these smaller centres with their own population hinterlands. The bus lines that were established also provided connections to the key S-Bahn stations such that the passengers in these rural districts could enjoy the same benefits as the City passengers, that is a uniform fare structure and integrated schedules and services.

The resulting unified transportation system provides a network of some 2,570 route kilometres of service, with approximately 2,500 vehicles and commuter rail, rail rapid transit, surface tram, city bus and regional bus services. Of the 1.6 million weekday passengers, 600,000 ride the S-Bahn and 600,000 ride the U-Bahn. Approximately one-third of these passengers transfer between the two systems.

CHARACTERISTICS OF FARE INTEGRATION

The fare collection system employed within the MVV services is the proof of payment or "honour" system. The ticket fare is based on distance travelled. To facilitate ticketing, the entire MVV area is divided into tariff zones. These zones are laid out concentrically from the centre of Munich. The radial zones are segmented to provide for non-radial travel.

The two inner most zones - the central zone and the first concentric ring of zones, comprise the extended Munich City area. The ticket price consists of a basic charge for two zones plus a fixed amount for each additional zone. Single ride tickets are sold as well as strip (multi-ride) tickets, with each strip representing the fare for one zone. The strip ticket used in Munich is on the same principal as was the forerunner to the Strippenkaart employed in the Netherlands.

Single ride short trips can be paid for on a fare stage basis, resulting in a fare paid less than the zone based fare structure. A 24 hour ticket is also available and is used primarily by tourists. One ticket covers the entire metropolitan area, while another is valid for travel throughout the entire MVV region.

Children, ages 5 through 15, appear to be the only beneficiaries of a concessionary single ride fare.

Weekly and monthly passes are also available from the MVV, but these are based on a different zone system than the single and multi-ride fares. The entire MVV area is divided into a large number of small zones. The basic price for the monthly or weekly pass is calculated with a base fare for two of these zones and an additional amount for each further zone. Travel is permitted between the two zones that are identified on the pass. Once the pass is purchased the passenger buys a stamp which is affixed to the pass validating it for each successive week/month. These stamps can be purchased at some 350 agencies throughout the region.

The MVV is very market oriented. It works with the City Tourist Office, the Trade Fair companies as well as numerous hotels and travel agencies to offer daily passes as part of admission tickets, etc. For the MVV this has provided penetration of a class of passenger which formerly did not use public transportation services.

FARE INTEGRATION IMPACTS

Since its inception, the MVV has worked to unify and integrate the public transportation system in the metropolitan Munich region. This has meant the elimination of service duplication and the planning and implementation of new routes and services. One of the major strategies aimed at unifying the public transportation system was fare integration, however this was implemented along with major changes in the services as well as changes in the organization and management of these services. Thus, it is not possible to segregate the impact of fare integration from the other changes that were made. The net total affect however has been very beneficial as demonstrated in Exhibit 6.2, which shows the change in the status of the MVV service area transit operations between 1973 (the first full year of service under the MVV) through 1982.

During this period, annual passenger trips increased by 106 million or 30%. While no detailed information is available for the period prior to the inception of the MVV, one report indicated that the growth in passengers from the period prior to 1972 to 1982 is in the order of 70%.

While costs increased by 62% over the period, this was all due to inflation, since the number of train and bus kilometres of service provided were virtually the same at the end of the period as at the beginning. Significant productivity improvements were achieved through consolidation and integration of services as well as the removal of service duplications.

A major objective of the MVV has been to increase the proportion of operating costs that are covered from passenger revenue. Substantial increases in ticket prices took place in 1974, 1976 and 1980. The net

EXHIBIT 6.2

COMPARISON OF MVV STATISTICS

YEAR	PASSENGERS CARRIED	OPERATING COSTS ('000 DM)	OPERATING DEFICIT ('000 DM)	DEFICIT AS A % OF COSTS	REVENUE/COST RATIO
1973	358 million	493,000	275,000	56%	.43
1974	395	559,000	317,000	57%	.42
1976	412	595,000	299,000	50%	.49
1978	432	624,000	286,000	46%	.48
1980	451	705,000	274,000	39%	.56
1982	464	801,000	348,000	43%	.52
Change Over period	106 million 30%	308,000 62%	73,000 26%		

effect of this was a 94% increase in passenger revenue over the period and only a 26% increase in the operating deficit. Further, despite these fare increases, passenger use of the system continued to grow over the period.

The deficit as a percent of operating costs decreased from 56% in 1973 to 43% in 1982 and the revenue/cost ratio increased from 43% to 52% in the same period. The revenue per passenger increased from 0.59 DM in 1973 to 0.89 DM in 1982, representing a 51% increase.

While there were 464 million passenger trips taken on the system in 1982, these were linked trips (including transfers), and the individual mode trips comprised some 622 million passengers. Stated another way, this means that approximately one-third of all public transport passenger trips in the region involve an intermodal transfer.

Overall, the combined effects of the various initiatives taken by the MVV have been very positive and have produced a substantial increase in passengers carried, productivity, and financial performance of the combined services coordinated through the MVV.

CURRENT STATUS OF FARE INTEGRATION

The MVV continues to work toward the development of improved public transportation services, including the planning for and construction of additional U-Bahn lines and other surface routes. As far as we are able to determine, there is a high degree of satisfaction with the fare integration scheme that was originally implemented and no significant changes are being planned for it.

The MVV must allocate fare revenue collected from joint tariffs. The original agreement provided that each partner would receive a share of fare revenue proportionate to the vehicle kilometres of service provided. The distribution in 1977 covered about 60% of SMV's operating costs but only 35% of DB's operating cost. Because its costs are higher per vehicle kilometre, the DB argues it should receive a larger ratio of the MVV's passenger revenues. It is not known if and how this point of contention has been resolved, but presumably it would also apply to the distribution of revenue to regional bus operators.

COMMENTARY

It is obvious that the implementation of the MVV was very carefully planned and coordinated. The initial partners had the same overall objectives and believed that a coordinated approach would be of benefit to both. The achievement of a harmonious agreement with some 40 (mainly private) bus operators to join the MVV as equal partners must be considered to be a major achievement.

The development and implementation of the unified fare structure, including the principles on which fare revenue is to be redistributed, is an achievement of equal importance to the major rationalization and restructuring of public transportation services that took place over the first five years of the MVV operation.

In many other parts of Europe and Britain, equity appears to have played an important part in setting the fare structure. This is depicted by the relatively fine grained zone structure within the region, having the central area of the City of Munich as a single zone. A further indication of this concern is the stage fare basis for short distance trips. This provides a very wide range of fare prices, depending on distance travelled.

Since the MVV and the measures it intended to implement were seen to be a benefit to all of the participants (even the private bus companies), no significant problems were encountered in implementing these measures. The point of interest here is that all participants were seen to benefit from the arrangement and planning for new/modified services was undertaken in a very cooperative manner. The role of the MVV has not been heavy handed but has been more of a coordinating function assisting the participating members in resolving the best approaches to solving their problems.

7. PARIS

BACKGROUND

Public transit in the Paris Region is provided by two major public transit agencies and a number of private bus companies. La Regie Autonome des Transports Parisiens (RATP) is the main carrier, operating part of the regional express rail system (le Reseau Express Regional - RER) as well as a major portion of the urban and suburban bus network and the entire Metro system. The RATP is a regional organization serving Paris and the surrounding suburbs and it was formed in 1948 by joining the formerly separate subway (metro) and bus systems.

The other part of the regional rail system is run by the French National Railways (La Societe National des Chemins de Fer Francais - SNCF), as part of its national rail network.

In addition to these two major public transit operating agencies, about 55 smaller, private bus companies provide service primarily in the suburban municipalities surrounding the City of Paris. These companies are organized into the Association Professionelle des Transporteurs Routiers (APTR).

The operations of the RATP, SNCF and the APTR are coordinated through Le Syndicat des Transports Parisiens (STP), an agency set up by Central Government legislation in the early 1960's with the responsibility to represent the joint interests of the central and local governments, and the public transit agencies and operators. The STP is responsible for the receipt and dispensing of subsidies, overseeing financial management and approving capital investments.

The Paris Transport Region contains a population of 9.5 million within a geographic area of 4,000 sq. km. (1,600 sq. mi.). Within this region the City of Paris contains 2.2 million population within an area of

105 sq. km. and the area served by the RATP includes some 7.3 million population within a 1,200 sq. km. area.

The total annual public transit ridership in this region comprises almost 2.8 billion trips and 60% travel on the "Carte Orange" (a period pass). The breakdown by carrier/association is as follows:

- RATP - Metro - 1,156 Million
  - RER - 257
  - buses - 754
- SNCF - 457
- APTR - 150
- Total - 2,774 Million

There are several unique characteristics of the method by which the public transit agencies in the Paris Region are financed. According to law, the RATP must meet all its operating expenses (including replacement of rolling stock, the cost of permanent structures and the repayment of principal and interest on loans) from current operating revenues. In practice, however, the RATP has sustained sizable operating deficits. The level of fares needed to balance the budget is called the "module d'equilibre" which is set by the STP after it reviews the budget projections of the RATP. The Central Government in practice has not allowed fares to increase this much and has provided a compensatory indemnity or subsidy to the RATP to cover the difference between the "module d'application" or actual fare revenue and the revenue required to meet operating expenses. This subsidy is shared with the local governments, with approximately 70% coming from the Central Government. By 1978, operating revenues accounted for only 46% of operating expenses (operating expenses include repayment of principal and interest on capital loans).

The RATP also receives compensation for the loss of revenues resulting from special fare reductions. The RATP is reimbursed by the STP for the loss of revenue from the "Carte Orange" period passes which are sold at a substantial reduction from full fare prices. This reimbursement comes from the proceeds of an Employment Tax (Le Versement Transport) instituted in 1971 on firms employing 10 or more people in the Paris Region. This tax ranges from 2% in the City of Paris to 1.2% in the suburban communities and now constitutes 15% of all operating revenue.

The central and local governments also provide reimbursement to cover losses from reduced fare categories, including the disabled and the elderly. In addition, the RATP receives subsidies from local governments on individual routes which run at a deficit (after consideration of all other subsidies) and where the service is operated to support local objectives, for example the encouragement of suburban industrial development.

The most unusual aspect of this financing scheme is the Employment Tax which has provided a reliable and growing source of revenue, shifting part of the financial burden for public transit from the government sector to the business sector. Since the introduction of the Employment Tax, the share of the cost of the Paris Region transit system borne by users and government has declined. This new source of revenue has given the transit operators additional financial flexibility needed to maintain, improve and extend the system and to attract additional transit patronage.

CONDITIONS PRIOR TO FARE INTEGRATION

Prior to the introduction of fare integration through the "Carte Orange", each carrier had its own period pass, with weekly passes being the most popular. Public transit patronage was declining and increased private automobile use was occurring. While the rail systems operated by the RATP and the SNCF were interconnected, each employed their own fare structure and fare media which was a burden of inconvenience for the passengers as it necessitated fare checking of all transferring passengers. As a result of the proliferation of different fare media, a large number of distributors had been set up to sell these media to the public.

For the commuter travelling from the suburbs to the City of Paris and transferring between carriers, an individual fare was required for each carrier which added to the inconvenience and the cost of making the trip. Because each carrier had its own fare structure, this also implies a variety of different fares for the same trip, depending on the carriers used. Period passes were not available for travel to/from and within the outer suburban zone, except on the SNCF system.

As indicated previously, the STP was established in the early 1960's to coordinate the management and operation of public transit in the Paris Region. Because of the discontinuities in the fare system, it was this agency which provided the initial impetus to integrate fares within this Region.

OBJECTIVES OF FARE INTEGRATION

The objectives of fare reform in the Paris Region were:

- fare equity, by providing a fare structure which was graduated according to the service provided and which would yield a reduction in the cost of longer distance trips as compared with the fares in place before fare integration;
- to encourage, through the use of the fare structure, suburban travel by public transit;
- to facilitate transferring passengers between carriers on a single trip.

It was expected that fare reform would lower the costs of administration by reducing the need for a large number of distribution outlets selling a variety of different passes for each carrier. Further, fare collection costs were expected to be reduced by the reduced need to install fare verification equipment in the large transfer stations at the junctions of the RATP and SNCF rail networks.

Fare revenue was expected to decline as a result of the fare reform initiatives because of the overall reduction in fares for longer distance travellers. This reduction in revenue to the carriers was to be compensated for by an increase in subsidies administered through the STP. The source of this subsidy was the Employment Tax referred to earlier.

Increased ridership on public transit was not a primary goal of fare reform; however, as indicated later in this section, the result of fare reform contributed to reversing the decline in public transit ridership in the Paris Region. It was expected that the simplified fare structure would increase convenience to the passengers and would simply fare administration due to a reduction in the number of different fare media and fare levels.

IMPLEMENTATION OF FARE INTEGRATION

The principal agency responsible for fare reform was the STP. This agency worked with a task force of the carriers/agencies to develop the financial mechanisms for revenue and subsidy distribution. Final decisions on the structure of fare integration were taken by the Central Government.

The central focus of fare integration, the "Carte Orange", a monthly unlimited travel card in a five concentric radial zone structure, was introduced in 1975. In 1976 it was extended to an annual period pass and in 1982 it was further extended to a weekly period pass.

Exhibit 7.1 shows an example of the Carte Orange. The basic information, including a photograph, is retained in a fixed card and the renewal pass can be removed and replaced. The example shows a card valid for the month of February, 1979 for unlimited travel between all zones in the system.

EXHIBIT 7.1

CARTE ORANGE USED IN THE PARIS REGION

This ticket is removable, for replacement at the end of the validity period and for use in magnetic gates.

The systems which had to be put in place to accommodate the Carte Orange were:

- defining methods to estimate pass use by carrier;
- determination of the formulas for sharing revenue from pass sales;
- determination of the formulas to compensate for revenue loss by carrier.

The only new equipment required to accommodate the Carte Orange was stamping machines to validate the renewal ticket for the period purchased.

CHARACTERISTICS OF FARE INTEGRATION

As indicated earlier in this section, the Paris Transport Region contains 9.5 million population within a geographic area of 4,000 sq. km. Total annual public transit passenger trips are approximately 2.8 billion, with 60% of these trips using the Carte Orange for fare payment.

The Carte Orange is sold through agencies of RATP and SNCF who share the pass revenue according to proportions determined from surveys of passenger use by carrier. The APTR carriers operating the private bus services in the suburban municipalities of the region, do not receive any direct revenue from pass sales; however, they are compensated by a formula which takes into account both the number of Carte Orange passes sold in their service area and their fare structure.

Fare Structure

To facilitate the uniform adjustment of fares on the RATP bus system, the Metro and the RER rail system, fares are expressed in terms of a fare module which is designated as "V". This fare module does not apply to the Carte Orange and a slightly reduced fare module "V_1" is used to compute the cost of weekly 12 trip passes. In 1983 the value of "V" was set at 2.40 F. The 1984 value of "V" is not known, but the 1984 Canadian dollar equivalent of the 1983 value of "V" is 2.40 x 14¢ = 34¢. The value of "V_1" in 1983 was 2.30 F or 32¢ Canadian.

The fare media in common use in the Paris Region include:

1. Tickets; full fare tickets plus half-fare tickets provided to children, disabled persons and groups of young people travelling together.
2. 12 trip passes; these are valid for a maximum of 7 consecutive days and provide for travel on 6 return trips using the same route on each trip. This very popular pass is available for second class travel only and is provided at a cost which is at least a 32% reduction over the full fare ticket price.
3. The Carte Orange; a period pass which is available in weekly, monthly and annual denominations and is valid for travel on all carriers operating within the Paris Transport Region.
4. Paris Sesame tickets validated for unlimited travel for 2, 4 and 7 day periods and primarily used by tourists.
5. Student monthly passes for use on the regional express system and restricted to a single route (from home to school).

The period passes can only be used by the persons to which they are issued and they are priced at substantial discounts to encourage regular commuter passengers.

The method by which the above fare structure and fare media types are employed on each of the major carriers is described below.

Paris Metro

The Paris Metro has a flat fare, including travel within the City and the extensions beyond the City. The fare media prices in 1983 were as follows:

- full fare ticket - 1.6 V (54¢)
- 10 ticket book - 10 V (37% reduction over full fare ticket)
- weekly 12 trip pass - 8 V_1 (60% reduction over the cost of full fare ticket)

The ratio of the costs of a weekly 12 trip ticket is held constant to the cost of the Carte Orange for the same trip.

Regional Express System

Travel within the City of Paris on the RER system is priced at the same level as the Metro fares. Beyond the City of Paris boundary, the RER fare structure is based on stages of 2.5 km. in length, with a fare increase for each additional two stages of travel. The price of an RER ticket from the suburbs to destinations in the City of Paris includes the price of the suburban stages plus a 1V fare for travel within Paris.

Ticket books for suburban travel are not discounted and there is a fare transition zone at the edge of the Paris Transport Region to adjust for the difference between urban/suburban travel on the SNCF national rail system and the fares associated with travel on this system beyond the Paris Transport Region.

Buses

Bus travel both within the City of Paris and the suburbs is based on a stage fare system. In Paris the stages are approximately 1.5 km. in length. Travel of up to two stages costs a fare of 1V. Travel of three or more stages costs a fare of 2V. Bus fares are route specific and there are no transfer privileges between routes. Thus, longer distance trips within the City of Paris would be made on the Metro system where Metro service is available. A 12 trip weekly pass on the bus system is available at a price of 8 V_1 for travel up to two stages and at a price of 14 V_1 for travel of three or more stages. To discourage the purchase of tickets on board the bus, tickets sold on-board cost 1.6 x their value if purchased off-board.

Suburban bus travel is priced on a stage fare basis, with the same fare structure as the City of Paris for travel of up to five stages. The prices for longer trips are as follows:

- 6 to 8 stages - 3 V
- 9 to 13 stages - 4 V
- 14 plus stages - 5 V

Thus, the fare structure for suburban bus travel diminishes the cost per kilometre of travel as the length of the trip increases.

As with bus travel within the City of Paris, there are no transfer privileges between bus routes for passengers paying with single trip or 12 trip weekly passes.

Paris Sesame Tickets

These tickets are available primarily to tourists and provide a first class pass for unlimited travel within the Paris Transport Region. A two day pass costs 20 V, a 4 day pass 30 V and a 7 day pass 50 V.

Carte Orange

As indicated earlier, the Carte Orange is a period pass allowing unlimited use of the public transit services within five concentric zones as follows (Exhibit 7.2):

- zone 1, or the central zone, corresponds to the City of Paris;
- zone 2 surrounds Paris at an average width of 2 km.;

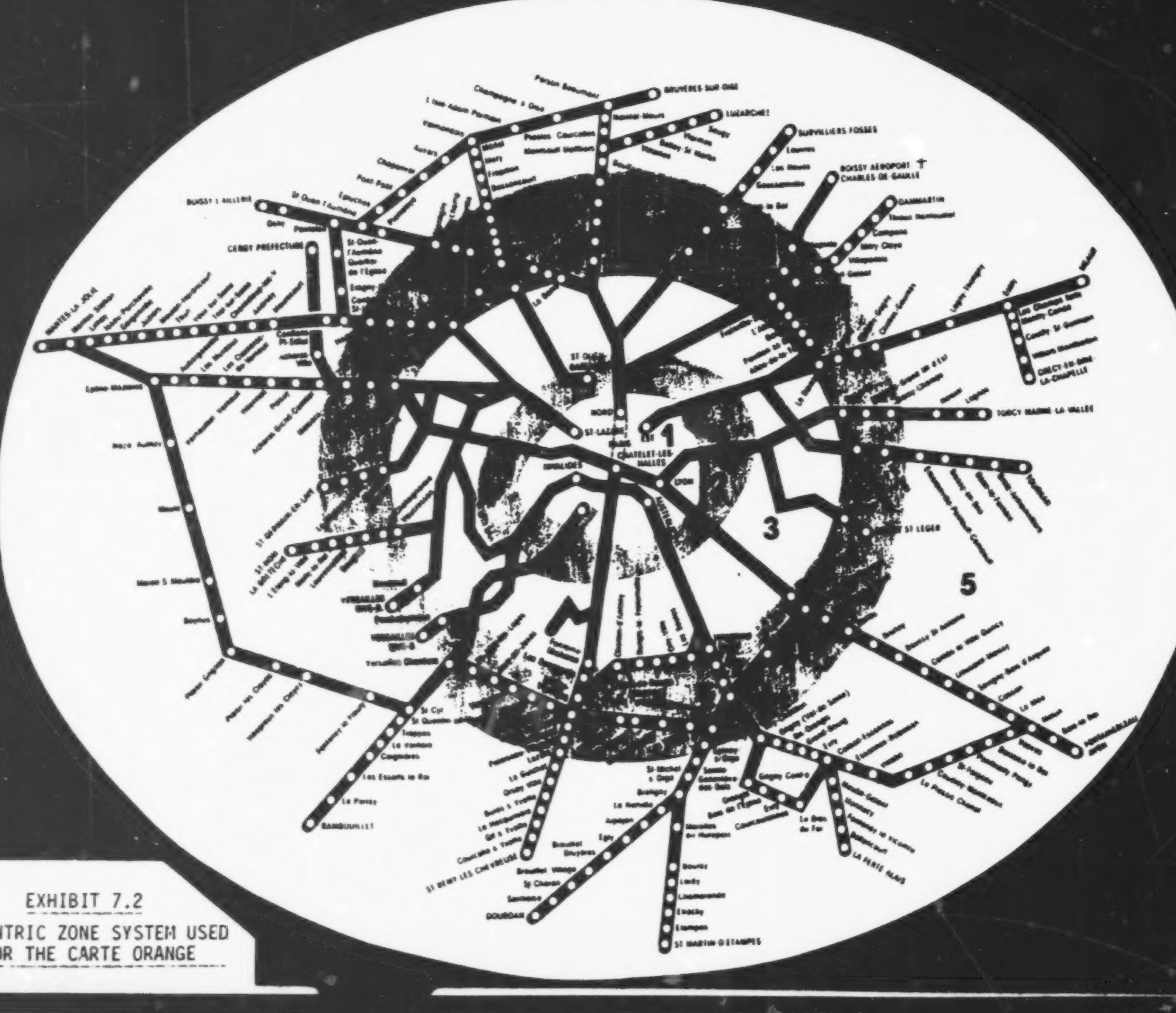

1
3
5
CHATELET-LES-HALLES
ST-LAZARE
NORD
LYON
INVALIDES
ST OUEN
BRUYERES SUR OISE
LUZARCHES
SURVILLIERS FOSSES
BOISSY AEROPORT
CHARLES DE GAULLE
DAMMARTIN
CRECY-EN-BRIE
LA-CHAPELLE
TORCY MARNE-LA VALLEE
ST LEGER
BOISSY L'AILLERIE
CERGY PREFECTURE
MANTES-LA JOLIE
ST GERMAIN-EN-LAYE
VERSAILLES
RAMBOUILLET
ST REMY LES CHEVREUSE
DOURDAN
ST MARTIN-D'ETAMPES
LA FERTE ALAIS

EXHIBIT 7.2

CONCENTRIC ZONE SYSTEM USED FOR THE CARTE ORANGE

- zones 3 and 4 are the next concentric zones and are approximately 5 km. and 8 km. in width respectively;
- zone 5 extends to the limit of the Paris Transport Region.

This zone structure, with the increasing width of more remote zones, provides for a fare structure which is tapered to reduce the cost per kilometre of longer trips.

The Carte Orange is available for a minimum of two zones and is therefore not useful for trips entirely within the City of Paris. A weekly Carte Orange costs approximately seven times a single ride fare; a monthly Carte Orange costs approximately 3 1/2 times the weekly price or about 25 times the single ride fare; and the annual Carte Orange costs about 10.8 times the monthly price or about 270 times the single ride fare price. These substantial discounts have significantly influenced fare purchases in the Paris Transport Region such that approximately 60% of all public transit travel in the Region is made using the Carte Orange for fare payment.

Rail fares are available in both first and second class denominations and the prices quoted above are based on second class travel. First class fares cost typically 1.5 times the second class equivalent and are available for single ticket purchases, 10 ticket booklets and the Carte Orange. Weekly 12 trip passes and bus ticket media are only available in second class fare denominations.

Distribution of Fare Revenues and Subsidies

As indicated previously, reimbursement to individual carriers is provided in the form of specific subsidies. These funds are administered through the STP except where noted otherwise. The specific subsidies are designed to make up the difference between fare revenues and operating costs for each carrier. The following subsidy programs are currently in effect:

1. The fare revenue lost by reduced fare concessions to the disabled, children and students is shared 70% by the Central Government and 30% by the local municipalities.

2. Fare revenue losses as a result of reduced fares for the elderly are made up entirely by the local municipalities.

3. The loss of revenue attributable to the Carte Orange and the 12 trip weekly passes are compensated through revenues from the Employment Tax.

4. In setting the budget for each carrier each year, the Central Government fixes the fare structure and agrees to compensate each carrier through the STP for the difference between total operating expenses and the operating revenue associated with the designated fare structure. This subsidy is shared between the Central Government and the local governments in the ratio of 70% and 30% respectively.

5. Individual local municipalities who wish to provide a special purpose public transit service, for example to a new town or to encourage suburban industrialization, can subsidize this service directly (this subsidy option has not been used to any great extent).

Revenue from the sale of the Carte Orange, which is sold by RATP and SNCF ticket outlets, is shared between these two carriers according to a formula which takes into account the number and type of cards sold and used on each carrier (usage determined by passenger surveys). The APTR does not sell the Carte Orange but does honour its use on their bus routes. The STP compensates the APTR based on card sales in each of the bus company service areas as well as periodic passenger surveys of use.

FARE INTEGRATION IMPACTS

The public reaction to the Carte Orange was immediate and positive. Six months after introduction of the monthly Carte Orange, sales reached 880,000 per month. By January, 1984, following the introduction of the weekly and annual Carte Orange, there were 1,850,000 Carte Orange passes in circulation. Aside from the attractive financial incentive in the price of the Carte Orange, in late 1982 the Central Government required employers to reimburse their employees for 50% of their public transit pass costs (both weekly 12 trip passes and the Carte Orange).

The result of the overwhelming popularity of the Carte Orange program was that by 1983 60% of all public transit trips in the Paris Transport Region were taken with the Carte Orange method of fare payment (weekly, monthly and annual passes).

The principal objectives of fare reform which were cited earlier have all been attained. These include:

- a fare system based on service provided;
- a fare structure which is tapered to reduce the costs per kilometre of service as trip length increases;
- facilitation of multi-modal journeys by allowing transfers without additional fare payment.

The Carte Orange has eliminated a large number of fare types and fare media, partly as a result of its success and partly because it was designed to eliminate certain fare types. On the RATP alone, for example, the number of fare types fell from 400 to 240 as soon as the monthly Carte Orange was introduced.

The Carte Orange has increased public transit ridership, reversing the decline in ridership which had been experienced for several years prior to its introduction. Specifically ridership has increased from a 1974 annual level of 2,300 million to a 1983 level of 2,800 million passengers in 1983. Significant increases occurred on the bus and regional express systems. This passenger response has lead to an overall upgrading of the public transit services including an improvement of the image of public transit.

The methods that were established to distribute fare revenue and subsidies have worked well in practice and have been readily accepted by the carriers.

Revenues from fares per passenger have decreased as a result of the introduction of the Carte Orange with its significant discounts, but these revenue losses have been more than made up by the Employment Tax. The result has been that the user and government share of operating costs have declined, with the Employment Tax now contributing 15% of total revenue.

Sales of the Carte Orange exceeded all projections made prior to its introduction.

This model of fare integration has been copied by other cities in France.

CURRENT STATUS OF FARE INTEGRATION

The STP, as the agency overseeing public transit in the Paris Region, will likely be replaced in 1985 by a department of the Regional Government which has jurisdiction over a larger geographic area than the currently defined Paris Transport Region, the area referred to as the "Ile de France". This is not expected to change the basic policies concerning fare integration.

As a result of the significant success of the Carte Orange, studies are being undertaken to extend this idea to include fare payment for all multi-modal journeys. The first step in this direction could be the introduction of a daily Carte Orange and this might be followed by a single trip Carte Orange. At the present time, public transit trips made on other fare media do not enjoy the multi-modal privileges of a Carte Orange.

Steps may also be taken to simplify the zone structure in the Paris Region even further, with the amalgamation of the current Carte Orange zones 2 and 3 into a single zone in a few years.

Passenger sales congestion which takes place at the beginning of each month on the purchase of the monthly Carte Orange is being alleviated by the introduction of a yearly integral card which can be paid for monthly by cheque or bank money orders.

The goals of continuing fare reform include increasing public transit ridership, especially for non-work related trips, increasing fare revenue, and simplifying the administration of the fare structure by decreasing the number of different types of fare media.

There are some obstacles to continuing fare reform in the Paris Region. The first is the necessity to ensure that, in these difficult economic times, government expenditures to subsidize public transit don't increase. Secondly, if the fare structure is simplified it is bound to benefit some categories of passengers and increase the cost for others. This delicate issue must be politically acceptable. Third, control equipment and systems for checking fare payment must be compatible, particularly between rail and bus systems. This level of compatibility has not yet been achieved in the Paris Region. Fourth, fare discontinuities at the boundary of the Paris Transport Region, between the fare structure on the SNCF national network and the fares that apply for local travel in the Paris Region are a practical problem which needs to be overcome.

Despite these potential difficulties, it is expected that fare reform in the Paris Region will continue along the lines outlined above.

COMMENTARY

The most unique aspect of the Paris fare integration experience is the institution of an Employment Tax to support the reductions in travel costs for regular commuters associated with the Carte Orange program. In addition to this, the Central Government requires employers to pay 50% of the cost of these work related public transit passes.

The fare structure and zone system employed with the Carte Orange program result in a substantial distance taper on fare costs for long distance trips. It appears that, with some further consolidation of the suburban zones, Paris will end up with a zonal width of approximately 5 km. for radial trips, which is in line with the zone structure employed in other jurisdictions. If non-radial trips are made within a single zone, this fare structure provides a significant financial incentive, which was one of the objectives established for fare integration at the outset.

Another factor of importance in the Paris Region is the very strong role played in the determination of fare structure by the Central Government. Many aspects of the fare structure, level of service and organizational structure have been established by Central Government decree.

In terms of passenger appeal, the Carte Orange program has been a resounding success and it is anticipated that the principles involved in this program will be extended to include single trip and other short period passes and that these additional measures will support increased ridership on the public transit systems of the Paris Region, but if the experience to date with this program is an indicator, they will not result in increased passenger revenue.

8. PERTH

BACKGROUND

Perth is the capital of Western Australia and is located on the southwest coast. The metropolitan area of Perth is contained within a radius of approximately 45 km from the centre of Perth and contains approximately 1,000,000 people in this vast region of approximately 3,200 sq.km (1,250 sq.mi.).

The public transportation system operating within this metropolitan region has evolved over several decades. Initially ownership and operational control of public transportation services were through the Western Australian Government, with two operating agencies, one for tramways and ferries and the second for railways. Subsequently there was a very rapid expansion of unregulated bus services which often provided intense competition with each other and with the tramways and railways. Within this system there was no transfer privileges between carriers.

As a means to provide some measure of control on the private bus operators, measures were implemented in the 1930's to tax and regulate the private operators and finally to control fares, routes and other facets of bus operations. The Transport Board set up by the Western Australian Government levied a tax on operators' gross receipts.

In the post WW II period, the private bus companies experienced declining revenue and increasing costs, resulting in an appeal to government for a reduction in taxes. This proposal was turned down and the government proclaimed in January, 1958 the Metropolitan (Perth) Passenger Transport Trust (MTT) empowering the Trust to acquire all private bus services and to operate all government owned services (excluding the railway).

By June, 1962 the MTT had acquired all the private bus companies and had consolidated its operations. This move provided the following benefits:

1. It assisted the failing private bus operator to give up the business without a monetary loss.
2. It rationalized the public transport system and thereby paved the way for later improvements in services.
3. It provided an equitable fare structure applicable to bus, tram and ferry services. Passengers were charged on a fare stage basis with each stage roughly 1.6 km.
4. Passenger convenience was increased due to the new fare structure as well as improved timetables and services.
5. There were some economies associated with central administration of all the services.

In the subsequent years many changes have been implemented to make the public transport system more efficient. In 1973 financial responsibility for the suburban rail services (Westrail) was vested in the MTT, thus making it the single body responsible for the provision and financing of all passenger transportation services within the metropolitan region. This meant that:

1. There was fare integration between all services, allowing the public to travel on bus, rail and ferry services on the same ticketing system.
2. The real costs of metropolitan public transportation service were identified to the taxpayer.
3. There were improvements possible to consolidate information outlets, timetable publications and their distribution, lost property, ticket sales, etc.
4. It provided a more efficient and comprehensive service to the commuting public.

This transfer of financial responsibility to the MTT meant that it would assume full financial responsibility for all passenger public transport services in the metropolitan region; it would operate all bus and ferry services, and in addition plan and specify the rail services. Westrail would provide the rail services according to a service plan developed by the MTT and would be paid a pre-determined fee sufficient to cover their costs of service provision. The MTT would receive all fare revenue collected from bus, rail and ferry services.

CONDITIONS PRIOR TO FARE INTEGRATION

The previous section described many of the conditions prior to final fare integration in the Metropolitan Perth Region in 1973. Annual passenger volumes on each of the three major modes were as follows:

- bus - 59 million
- ferry - 400,000
- train - 10 million

There were 788 buses, 4 ferry boats and 78 pieces of rolling stock in the commuter rail system. These latter vehicles were self-propelled diesels with a normal consist containing either one rail car or a rail car plus a trailer.

At this time (1973) fares were still charged on a stage fare basis, but the fare structure between bus/ferry and rail services was not the same. The bus stage fare, as indicated above, was based on stages of 1.6 km approximately and up to 39 stages of travel could be provided for a fare of 80¢ (87¢ Canadian). Exhibit 8.1 shows the existing and revised fares which went into effect in August, 1974.

Exhibit 8.2 provides some indication of the difficulties related to fare integration with the Western Australian Government Railways (WAGR). The MTT bus/ferry schedule provided for six fare categories and the WAGR

EXHIBIT 8.1

FARE STRUCTURE CHANGE, AUGUST, 1974

No of Sections	As from 30.9.1973		Zone fare system Introduced as from 4.8.1974
1	10¢		15¢
2	20¢	INNER ZONE	30¢
3	20¢		30¢
4	25¢		30¢
5	25¢		30¢
6	25¢		30¢
7	30¢		30¢
8	30¢		30¢
9	30¢		30¢
10	35¢		30¢
11	35¢		30¢
12	35¢		30¢
13	40¢		30¢
14	40¢		30¢
15	40¢		30¢
16	45¢		30¢
17	45¢		30¢
18	45¢		30¢
19	50¢		30¢
20	50¢		30¢
21	50¢		30¢
22	55¢		30¢
23	55¢		30¢
24	55¢	ZONE 2	45¢
25	60¢		45¢
26	60¢		45¢
27	60¢		45¢
28	65¢		45¢
29	65¢		45¢
30	65¢		45¢
31	70¢		45¢
32	70¢		45¢
33	70¢		45¢
34	75¢		45¢
35	75¢		45¢
36	75¢		45¢
37	80¢		45¢
38	80¢		45¢
39	80¢		45¢
		ZONE 3	60¢
		ZONE 4	75¢

EXHIBIT 8.2

COMPARISON OF MTT AND WAGR FARE CATEGORIES PRIOR TO INTEGRATION

M.T.T. SCHEDULE

Adult Single
Half Fare
Student 5¢
Adult 28 Day Periodical
Scholars Over 18
Scholars Under 18

Total 6.

W.A.G.R. SCHEDULE

Adult Single
Half Fare
Privilege Ticket
Privilege Ticket Half Fare
Group Concessions
Weekly Ticket 6 Day
Calendar Month
Employees Half Fare
Employees Quarter Fare
Scholars Over 18
Scholars Under 18
Apprentice or Junior Worker
Quarterly
Employees Half Fare
Employees Quarter Fare
Pupils Term Over 18
Pupils Term Under 18
Half Year
Employees Half Fare
Employee Quarter Fare
Annual
Employee Half Fare
Employee Quarter Fare

Total 23.

PROPOSED SCHEDULE

Adult Single
Half Fare
Adult 28 Day Periodical
Student 28 Day
Scholars 5¢

Total 5.

schedule provided for 23, with the proposed schedule reducing both to five categories. Many of the concessionary fares associated with the WAGR service were to do with privileges applying to railway workers and their dependents for travel throughout the Westrail system. Negotiations with the railway union to delete these concessionary fares provided fruitless and they were retained for railway workers and their dependents. The fare structure for the general public was brought into line with the MTT bus/ferry schedule.

OBJECTIVES OF FARE INTEGRATION

The three principal objectives for introducing fare integration and a revised fare structure were:

1. To make fares more equitable.
2. To simply the fare issuing and collecting procedures.
3. To increase passenger convenience and thereby to encourage more passenger use of the system.

The stage fare schedule was replaced with a coarse zone system comprising radial zones from Central Perth containing an inner zone for all travel within a radius of 30 km from Central Perth, a second zone, the outer boundary of which was approximately 45 km from Central Perth and at the limit of the metropolitan area, and two outer zones for travel beyond the metropolitan area. A comparison between the new and old fare structures is shown in Exhibit 8.1.

IMPLEMENTATION OF FARE INTEGRATION

It was envisaged that the new fare structure, although increasing some existing fares and decreasing many, would be acceptable to the travelling public and would encourage additional patronage. The simplicity of the system would make boarding quicker and would introduce economies for the MTT through a reduction in necessary ticket inspectors. Included in the new fare structure was the facility to transfer from bus to rail, rail to bus and bus to bus, provided that all travel took place within two hours of purchasing a ticket.

A major advertising program was undertaken to acquaint the public with the radical changes to be implemented in August, 1974 (ref. Appendix D).

The stage fare was still retained for short trips within the central area of Perth, with the cost of this single stage travel being one-half the inner zone fare and without any transfer privileges. In addition, a somewhat unique overlapping zone boundary was introduced for relatively short distance travel between zones 1 and 2. The fare applicable for this shorter distance trip was 30¢.

At this point (1974) the only concessionary fares provided were to children and students. Adults had the choice of a straight single cash fare or a 28 day period pass priced at 28 times the two zone single ride price or 40 times the single zone fare. It is likely therefore that this pass was aimed primarily at long distance commuters.

Students could purchase a 28 days period pass at a cost of 75% of the adult pass. In addition, term tickets were available for students for use only on school days until 6:30 p.m. Children travelled at half the adult fare.

It appears that the new integrated fare structure met with public approval and the implementation went smoothly.

CHARACTERISTICS OF FARE INTEGRATION

Since 1974 there has been one major change to the fare structure. This took place in July, 1983 and involved a refinement of the coarse zone system, with radial zones outward from the centre of Perth at approximately 7 km radius each, with four new zones representing the initial inner zone, two new zones replacing the second zone, such that six zones were contained with the metropolitan area and the remaining two zones were unchanged for travel outside the metropolitan area.

This zone restructuring was implemented to provide a more equitable fare basis in which passengers paid a fare more closely approximating distance travelled. In addition, travel through the central area of Perth was surcharged by about 20%.

More concessionary fares were introduced by 1983, as a result of the increasing perception of the public transportation system as a social service. The basic cash fares are for adults, children and pensioner/concessionary fares. The child fare represents a 50% discount on the adult fare and the pensioner/concessionary fare represents a 70% discount. Concessionary fares are available to not only pensioners but various recipients of social welfare including the unemployed, low income earners, those receiving health benefits and miscellaneous others. Students under 18 are eligible for reduced cash fares. Students over the age of 18 are only entitled to reductions on multi-ride tickets and period passes. The 28 day period pass is still in effect and is priced at approximately 40 times the single cash fare. Ten ride tickets are available and are priced at a 10% discount over 10 single cash fares. In addition, day tickets are available for families, providing unlimited travel by bus, train or ferry anywhere within the zone 6 fare boundary (the metropolitan area). Day tickets are also available for individuals.

The implementation of the 1974 integration and its evolution through 1983 does not appear to have required a great deal of new equipment, since tickets were issued on-board the vehicle with equipment which imprinted time and other characteristics of the journey prior to 1974. Multi-ride ticket cancellors have been installed on the vehicles to cancel multi-ride tickets, a feature of the 1983 fare system changes.

FARE INTEGRATION IMPACTS

Fare integration was relatively easy to implement in Perth because the major transportation carriers were all appointed agencies of the Western Australian Government.

The introduction of fare integration resulted in a minor drop in passenger volumes which has been attributed to improve utilization of integrated services (e.g. prior to integration a combined bus/rail trip was counted as two trips whereas subsequent to fare integration it was counted as a single journey).

It should be noted that over the period from 1974 to 1983 a significant decline in bus and ferry ridership has been experienced:

	1974	1983
o bus	59 million	47 million
o rail	10 million	9 million
o ferry	0.4 million	0.3 million
	69.4 million	56.3 million

All revenue in the system accrues to the MTT which in turn is responsible for the operating costs of the bus, rail and ferry services.

One of the significant impacts of fare integration was the result of a two hour time limit on all tickets. This was intended to provide sufficient time for transfers in a multi-modal journey. It was hoped that this would increase patronage by attracting passengers who take relatively short trips by bus. Passengers were in fact encouraged to travel in and out of shopping areas within this two hour limit on a single fare. Unfortunately the impact of this two hour limit was not foreseen and many people now benefit from this provision by confining their business to take advantage of the concession. Persons who might previously have caught two buses to travel, now do so without paying a second fare. The MTT is currently reviewing the two hour transfer with a view to modifying it to reduce the adverse effect on revenue of this concession. The possibility of reducing it to one hour is one proposal being considered, although no decision has been made in this regard.

CURRENT STATUS OF FARE INTEGRATION

The MTT considers that, with the completion of fare integration including the modifications made in 1983, they have achieved the main objectives identified at the outset.

If they had been able to more accurately foresee the impact of the two hour time limit concession, it is unlikely that they would have introduced it in this form, as is indicated by their current review of this policy. They hope that changed provisions will allow them to recapture some of the revenue lost as a result of the two hour limit.

There are no other plans at the present time in Perth to modify the fare integration system that is now in effect.

COMMENTARY

The history of Perth provides an interesting commentary on the evolution of fare integration in a very large metropolitan region dominated by the City of Perth. Of note is the small number of operators (3), all of whom provided service through appointed agencies of the Western Australian Government. This made fare integration relatively easy to implement.

It should also be noted that fare integration was pursued in Perth primarily to increase the convenience of the public transportation system for the passengers, as determined by fares which were more equitable, and a fare system which allowed transferring between carriers without multi-fare payments.

Adult single cash fares are currently graduated from a 50¢ fare (55¢ Canadian) for a short trip in the central area of Perth without transfer privileges, to 80¢ (87¢) for travel in the central zone which has a radius of about 7 km, to $1.70 ($1.85) for travel between the centre of Perth and the edge of the metropolitan area in zone 6. This fare structure represents a substantial taper in favour of longer distance trips, with the maximum central zone trip representing a fare of about 11¢/km whereas the maximum trip to the periphery of the Metropolitan area represents a fare of about 4¢/km.

There is now a multiplicity of concessionary fares, with seniors/recipients of various welfare programs enjoy a discount of about 70% on the adult single cash fare.

9. METROPOLITAN TRANSPORTATION COMMISSION SAN FRANCISCO BAY AREA

BACKGROUND

The San Francisco Bay Area comprises nine counties bordering San Francisco Bay, of which the six southern counties have contiguous urban development and public transit systems (Marin, San Francisco, San Mateo, Santa Clara, Alameda, and Contra Costa). Within this area approximately 4.3 million population are served by seven major transit systems. Exhibit 9.1 describes some characteristics of the transit systems in the San Francisco Bay Area, including the seven major systems and services to four peripheral areas. Additional financial information is provided on Exhibit 9.2, showing the operating costs and makeup of the public subsidy to each system. More detailed information on the major seven transit agencies is provided in Appendix E.

Exhibit 9.3 shows the fare structure of the seven principal public transportation carriers in the San Francisco Bay Area, as at September 1, 1980 (prior to fare integration). Of the seven major systems, two had flat (universal) fares, MUNI and Santa Clara. While the geographic area served by MUNI is relatively small, the flat fare in Santa Clara County, with an opportunity to take north-south trips of about 45 miles, is open to question. Three systems used zone fares for most or all passengers, while another (AC Transit) had a zone fare for Transbay and express trips, but a flat fare for Eastbay local trips. BART had a station-to-station matrix which varies with distance for trips over six miles long, with some deviations from this formula to promote traffic in outlying areas. This basic fare structure is still in place today.

All of the seven major systems offer some form of pre-payment opportunity. However, BART and SamTrans do this only for the convenience of passengers and do not provide discounts. Four of the remaining systems offer discounted multi-ride tickets (MUNI is the exception) and four offer monthly passes (excluding Golden Gate Transit).

EXHIBIT 9.1

CHARACTERISTICS OF MAJOR TRANSIT SYSTEMS IN THE SAN FRANCISCO BAY AREA

System	Population Served		Urbanized Area Served		Annual Revenue Passengers	
	Thousands	% of Total	Sq.Mi.	% of Total	Thousands	% of Total
Five "basic" systems						
AC Transit - Service Districts 1 and 2	1,100#	26#	220#	17#	60,000	20
Golden Gate Transit	400#	9#	460#	35#	11,500	4
Municipal Railway	650	15	45	3	130,000	43
San Mateo County Transit ("Samtrans")	500#	12#	150#	11#	17,500	6
Santa Clara County Transit District	1,200	28	250	19	24,000	8
Two regional rail systems						
BART	(2,500)*	(58)*	(500)*	(38)*	45,000	15
Southern Pacific	(1,000)*	(23)*	(250)*	(19)*	6,000	2
Four peripheral areas §						
Central Contra Costa Transit Authority	250	6	120	9	2,000	1
TriDelta Transit	85	2	35	3	500	†
West Contra Costa Transit Authority	35	1	15	1	200	†
Livermore Valley	100	2	35	3	500	†
Totals (rounded)	4,300	100	1,330	100	300,000	100

* - These numbers (which are excluded from the totals since service areas overlap with other systems shown) are very rough approximations of the populations and areas which have feasible access by feeder auto, bus, walk, or other means to the rail system.

# - Excludes population and area of San Francisco, to/from which services is provided, but within which this system does not serve local trips.

† - Less than 0.5%. § - Including BART express buses in these areas.

Data sources: Information from planning staffs of transit agencies; latest population estimates of California Department of Finance; Caltrans Road System maps showing limits of urbanized areas.

NOTE: This table excludes Napa and Solano Counties, all of Sonoma County except for the Golden Gate Transit Service, and all small and paratransit operations.

EXHIBIT 9.2

FINANCIAL CHARACTERISTICS OF THE MAJOR TRANSIT SYSTEMS IN THE SAN FRANCISCO BAY AREA

($ Thousands)

	AC TRANSIT(5)	BART(6)	CCCTA	CALTRAIN(7)	GGBHTD(8)	SF MUNI	SAMTRANS	SANTA CLARA	SANTA ROSA	VALLEJO(11)	REGIONAL TOTAL
Total Operating Expenses	95,474	117,865	5,045	24,192	34,403	164,213	23,579	85,794(9)	1,344	1,178	553,087
Total Operating Revenue	33,196	66,583	714	8,100	16,312	51,737	6,661	8,890	355(10)	256	192,804
Fares	32,178	60,727	623	7,900	15,838	51,093	5,994	8,803	235	256	183,647
Farebox Ratio	*33.7%*	*51.5%*	*12.4%*	*32.7%*	*46.0%*	*31.1%*	*25.4%*	*10.3%*	*17.5%*	*21.7%*	*33.2%*
Total Operating Assistance	60,291	63,806	4,315	16,418	18,091	109,944	16,873	76,904	1,033	922	368,597
Local	19,553	61,060	0	2,147	11,248	74,286	5,039	44,621	0	0	217,954
Taxes	13,440	61,060	0	1,747	0	0	5,039	44,621	0	0	125,907
Other	6,113	0	0	400	11,248	74,286	0	0	0	0	92,047
State & Regional	35,225	2,542	4,277	12,202	5,785	28,787	9,574	24,751	998	448	124,589
TDA(2)	17,385	103	4,425	3,173	4,304	14,507	9,574	24,751	998	830	80,050
STA(3)	2,109	2,439	0	1,426	0	4,604	0	0	0	0	10,578
AB 1107(4)	15,731	0	0	0	0	9,100	0	0	0	0	24,831
Other	0	0	-148(12)	7,603	1,481	576	0	0	0	-382(12)	9,130
Federal	5,513	204	38	2,069	1,058	6,871	2,260	7,532	35	474	26,054
Sec. 5	5,444	0	0	2,000	884	6,700	2,149	7,306	0	504	24,987
Other	69	204	38	69	174	171	111	226	35	-30(13)	1,067
Proportion of Federal Assistance of Total Expenses	*5.8%*	*0.2%*	*0.8%*	*8.6%*	*3.1%*	*4.2%*	*9.6%*	*8.8%*	*2.6%*	*40.2%*	*4.7%*

(1) Unless otherwise noted, budget figures represent or are calculated from 1982-83 certified data (fiscal audits, MTC resolutions, MTC final contracts).

(2) TDA: Transportation Development Act

(3) STA: State Transit Assistance

(4) AB 1107: One-half cent sales tax

(5) AC Districts 1, 2, and BART bus contract service only. Based on fiscal audit data.

(6) BART rail only. Based on Section 15 data.

(7) Operating revenue and expense data based on unaudited operator data.

(8) Represents bus and ferry divisions only. Operating revenue and expense data based on unaudited State Controller's report.

(9) Operating expense based on Section 15 data.

(10) Operating revenue calculated from audited and unaudited data.

(11) Operating revenue and expense data supplied by the operator.

(12) Includes adjustment representing allocated TDA funds unexpended by June 30, 1983.

(13) Includes adjustment representing a portion of Section 5 funds not eligible for 1982-83.

EXHIBIT 9.3

ADULT FARE STRUCTURE OF MAJOR TRANSIT SYSTEMS IN THE SAN FRANCISCO BAY AREA
(As of September 1, 1980)

System	Single Fares	Forms of Prepayment Available	
		Type	Price Basis
AC Transit - Transbay	Zoned (3 Eastbay zones).	20-ride ticket	5% discount
Eastbay	Zoned for express routes (3 zones). Universal fare for local routes.	Monthly pass	36 cash fares
Golden Gate Transit	Zoned (5 Northbay zones) for buses.	20-ride ticket	10% discount
	Higher fares on ferries.[1]	Weekly pass on ferries	See NOTE 1
Municipal Railway	Universal fare.	Monthly pass	32 cash fares
Samtrans	Zoned (4 zones south of San Francisco)	40-ride ticket	No discount (convenience only)
Santa Clara	Universal fare; higher for express routes.	Monthly pass-local routes	34.3 local cash fares
		Monthly pass-all routes	33.3 express cash fares
		22 local-ride ticket	9% discount
		40 express-ride ticket	16.7% discount
BART	Related to distance traveled with some modifications in formula.	Stored fare ticket	No discount (convenience only)
Southern Pacific	Zones (6 zones south of San Francisco)	Monthly "Every Day" pass	20.6-25.2 cash fares[2]
		Monthly "Weekdays" pass	18.8-23.3 cash fares[2]
		Seven-Day pass	5.5-6.9 cash fares[2]
		20-ride "Family" ticket	13.8-16.8 cash fares[2]
Contra Costa County Authorities	Universal fare within each authority or contract area.	None	
BART Express Buses	Zoned (maximum 2 zones per route).	None	

NOTES: 1 - Sausalito Ferry - cash fare always higher than comparable bus fare. 20-ride ticket sold at 10% discount from comparable *bus* fares; weekly pass priced at 5 cash fares.

Larkspur ferry - cash fare same as comparble bus fare weekdays, higher on weekends. 20-ride ticket sold at 10% discount from weekday fare; weekly pass priced at 6.7 weekday cash fares.

2 - Ranges shown are for travel to/from San Francisco; prices of a few passes between suburban zones fall outside these ranges.

Intersystem transfer arrangements did not follow any predictable pattern, as indicated in Exhibit 9.4. They developed in an ad hoc fashion and did not reflect marketing or equity considerations. Golden Gate accepted no transfers from other systems for policy reasons and BART did not for technology compatibility reasons. At the other extreme, Santa Clara Transit agreed to accept transfers from three of the four systems with which it interfaced, and under certain circumstances from the fourth (Southern Pacific).

Regional transit coordination takes place at two levels: supervision of the transit systems by the regional transportation planning agency (the Metropolitan Transportation Commission), and direct cooperation of transit managers (the Transit Operator Coordinating Council).

The Metropol[illegible] Transportation Commission (MTC) was created by the California Legislature in 1970 and has responsibility for transportation planning in the nine counties which abut San Francisco Bay. It has special powers and obligations under various state statutes which provide for subsidizing transit systems; one of its responsibilities is to ensure cooperation among the transit systems, including fare coordination and integration.

The Transit Operator Coordinating Council (TOCC) was created by state legislation in 1977 to achieve the coordination requirements for AC Transit, BART, and MUNI and was subsequently broadened to include the other major transit operators in the region. TOCC concentrates on policy matters, including discussion of pending legislation and on matters of direct concern to the MTC as the regional grant approving agency. The MTC Executive Director is Chairman of the TOCC. MTC also provides staff support to TOCC. The requirements of TOCC include:

- assistance to MTC in meeting State and Federal requirements;
- focus attention and advise MTC on needed transit coordination improvements;

EXHIBIT 9.4

TRANSFER ARRANGEMENTS (SEPTEMBER, 1980) AMONG MAJOR TRANSIT SYSTEMS IN THE SAN FRANCISCO BAY AREA

To From	AC	Golden Gate	Muni	Sam-trans	Santa Clara	BART	SP	BART Buses	CCCTA[1]	TDT	WCCTA
AC	x	None	None	None	Free	None	x	None	x	x	Free
Golden Gate	None	x	None[2]	None	x	None	x	x	x	x	x
Muni	None	None[2]	x	None	x	Half fare on Muni	None	x	x	x	x
Sam-trans	None	None	None	x	Free	None	Free on Sam-trans[5]	x	x	x	x
Santa Clara	Free[3]	x	x	Free[4]	x	None	Free[8]	x	x	x	x
BART	Free[3]	None	Half fare	None	Free	x	x	Free[4]	Free	x	x
SP	x	x	None	Free[5]	Free[7]	x	x	x	x	x	x
BART Buses	Free[3]	x	x	x	x	None	x	x	Free	Free	Free
CCCTA[1]	x	x	x	x	x	None	x	Free[4]	Free[6]	x	x
TDT	x	x	x	x	x	x	x	Free[4]	x	x	x
WCCTA	Free[3]	x	x	x	x	x	x	Free	x	x	x

NOTES: None - No arrangement; passengers pay two regular fares.
x - Intrasystem, or no direct interface.
1 - Refers to current contract services in CCCTA territory.
2 - Except 50¢ reduction in fares when transferring to/from ferries.
3 - For trips within the Eastbay only.
4 - For first zone of connecting system only.
5 - If SP rail ticket is shown.
6 - Between Concord and Pleasant Hill contract routes.
7 - Intra-county SP trips only, except at two stations where all SP trips are accepted.
8 - Intra-county SP trips only.

- encourage participation of the operators' top management in MTC's deliberations concerning public transit policy.

CONDITIONS PRIOR TO FARE INTEGRATION

In many Metropolitan areas one or two major transit systems dominate, with possibly smaller systems on the periphery. In the Bay Area, five systems provide the basic local service in five distinct territories; four of them interface in San Francisco. Two rail systems are superimposed on these. The systems vary in the number of passengers carried, areas served, and population served, but none of them offers a region-wide service. As a result, transit trips which require the use of two or more systems are a major factor in the regional transit riding pattern.

All transit systems operating in the region are eligible to receive Federal operating subsidies and California Transportation Development Act (CTDA) funds for both capital and operating cost subsidies. These funds are allocated through the Metropolitan Transportation Commission. AC Transit, BART and MUNI also receive operating subsidies from the special one half percent sales tax in Alameda, Contra Costa, and San Francisco Counties. BART is entitled to 75% of these funds outright, while the remainder is divided at the discretion of MTC between the two other carriers. The same three systems also receive some subsidies from toll bridge revenues for capital expenditures related to Transbay service.

As a result of a very long history of concern for the need to improve coordination among the transit carriers, in 1979 the MTC undertook a study of the feasibility of a joint fare prepayment demonstration project in the San Francisco Bay Area. The project was focussed on identifying, evaluating and selecting alternatives for achieving joint fare prepayment arrangements among several of the independent transit systems operating in the region. The hope was that joint prepayment would help achieve a higher degree of fare integration in the region.

The project was originally intended to design a joint fare prepayment demonstration which would then be implemented by the operating agencies themselves under a demonstration grant from UMTA. However, a rapid succession of events from the time of the initial project planning discussions considerably re-oriented their approach. Among the many external factors influencing the development of the project where passage of several State laws affecting both transit finance and operator-MTC relationships, and subsequent MTC actions to implement those mandates. A crisis in transit financing required concerted action by the three largest transit agencies to raise fares the same year. Despite this, the MTC pursued the development of a coordinated fare structure using funds from the sales tax base to support the program.

OBJECTIVES OF FARE INTEGRATION

The joint fare prepayment demonstration project identified alternative means of establishing joint monthly passes and joint single ride tickets. It was recognized that the integration of fares around monthly passes would be easier to implement and would require less total subsidy than single ride ticket integration and therefore it was decided to proceed first with the monthly pass integration.

While there was no explicit statement of objectives in the material submitted in response to our survey request to MTC, Exhibit 9.5 establishes the principles and guidelines for a coordinated fare structure that were required for implementation by AC Transit, BART and MUNI. These principles reflect a desire to achieve some uniformity in the fare policies between the three carriers, a requirement to enhance passenger convenience and flexibility in transferring arrangements between the carriers, and the possibility of more flexible pricing at different times of the day.

IMPLEMENTATION OF FARE INTEGRATION

The following is a description of the implementation schedule and plans for joint pass arrangements between carriers.

EXHIBIT 9.5

PRINCIPLES AND GUIDELINES FOR COORDINATING REGIONAL TRANSIT FARES AMONG MAJOR TRANSIT SYSTEMS IN THE SAN FRANCISCO BAY AREA

1. A uniform fare structure for the six major transit operators should be established throughout the region so that comparable fares are charged for comparable services.
    a. The fare structure should be built upon a uniform minimum base fare for local service, with additional charges based on distance traveled, service quality and the value of the service to the traveler.
    b. The uniform fare structure must be consistent with other MTC policies and requirements regarding the ratio of fare revenues to operating costs.
    c. The fare levels in the uniform fare structure should be re-evaluated periodically by the operators in light of changing financial, operational and travel conditions.

2. There should be a single discount which is easy to administer for special user groups; and the definition of the special user groups and their eligibility should be the same throughout the region.

3. Discount fares are desirable for off-peak and weekend transit users.

4. To the extent practicable, fare payment should be required of users no more than once during a one-way trip.

5. The development of new or improved fare collection equipment should be coordinated so that it is technologically compatible among operators.

EXHIBIT 9.5
(Continued)

6. Services or charters for special purposes or to special destinations tend to be unique to each operator, and therefore these fares should be set on an individual basis outside the uniform fare structure.

7. These principles should be considered by each transit operator's policy board whenever fare changes are contemplated.

AC Transit/MUNI Joint Monthly Pass (October, 1981)

This pass allows for unlimited travel on MUNI local transit service and AC Transit Transbay bus service. The pass is priced at the sum of the prices of both operators' monthly passes less a $2 discount. Approximately 800 joint passes are sold each month.

BART/MUNI Fast Pass (April, 1983)

For the price of a regular MUNI Fast Pass (currently $24) this monthly pass allows unlimited rides on local MUNI service and BART service within San Francisco. BART estimates that approximately 18,000 passengers travel on its system each weekday using the Fast Pass.

CalTrain Peninsula Pass (May, 1984)

In conjunction with the introduction of direct shuttle service between the Fourth and Townsend CalTrain Station in downtown San Francisco, this pass allows unlimited monthly travel on the CalTrain and local services on MUNI, SamTrans and Santa Clara County Transit. The pass is priced at the regular monthly CalTrain zone fare plus $10. Pass sales have steadily increased from 1,800 sold in May to 2,200 sold in June.

AC Transit/BART/MUNI Pass (Expected to be Introduced in January, 1986)

AC Transit, BART and MUNI are currently working towards instituting a single pass which is good for unlimited travel on all three transit systems during a set time period (e.g. monthly, weekday, bi-weekly, etc.). The current proposal will allow the pass to be used on the BART and MUNI Metro fare gates and as a flash pass on buses. The price of the pass has not yet been determined. This pass will be uniform in design and format and will supercede all existing passes among the three operators.

CURRENT STATUS OF FARE INTEGRATION

While there has been considerable study of the issues affecting fare integration in the San Francisco Bay Area, and while some efforts have been directed towards integrating fares through monthly passes, they are still in the very early stages of fare integration, with only a very small percentage of passengers purchasing and using joint passes.

It is not clear at this time what plans MTC has for going beyond their next objective which is the AC/BART/MUNI consolidated pass.

The general principle involved in the introduction of these passes seems to be that each system receives as revenue an amount representing the cost of its own pass. The discount offered on the joint pass is recouped from a regional transit subsidy fund through a central accounting procedure administered by the MTC. In order that the fare box ratio (revenue/cost ratio) of each system will not be reduced by this procedure, the discounts are treated as fractions of the pass which are purchased by governmental bodies on behalf of passengers who pay the remaining major fraction.

As compared with the actual current use of joint monthly passes referred to in the previous section of this report, the feasibility study on this project estimated that joint BART/MUNI/AC Transit pass would be attractive to 10,000 to 16,000 monthly users, and that the Southern Pacific monthly pass would be attractive to 4,000 to 4,700 monthly users. To fund the discounts for these two joint pass programs an annual subsidy (dollars 1980) of $1.3 million to $3.8 million would be required depending on the actual number of monthly users who participate in the pass programs.

COMMENTARY

There are several aspects of the San Francisco Bay Area transit organization which are similar to the Metro Toronto Region and several aspects which are very different. The Ontario Ministry of Transportation and Communications provides some of the functions and responsibilities of the Metropolitan Transportation Commission in San Francisco, but it is the single outside funding agency for the provision of transit services, whereas in San Francisco a variety of local, State and Federal funding programs are used to support public transportation.

Some of the problems experienced in San Francisco are similar to Toronto, with a predominant major city, significant surrounding urban development, and no comprehensive service and fare integration.

The experience to date in San Francisco is modest and it is too early to tell at this stage what its final impact will be.

10. METROPOLITAN TRANSIT DEVELOPMENT BOARD SAN DIEGO

BACKGROUND

The Metropolitan Transit Development Board (MTDB) was created in 1975 through a Bill in the California Senate and it came into existence on January 1, 1976. The Board of Directors of the organization come from the seven participating cities (San Diego, El Cajon, La Mesa, Lemon Grove, Chula Vista, Imperial Beach and National City), as well as representatives from the County of San Diego and one public representative appointed by the Governor of the State. MTDB members represent the San Diego metropolitan area, basically the southwest portion of the County, an area of approximately 1,150 sq. km (450 sq. mi.), containing a population of about 1.2 million or roughly 70% of the County population. The responsibilities of the MTDB include short range planning and the administration of some of the funding that is earmarked for public transit. The short range planning responsibilities include:

- the development and annual updating of the area's short range transit plan covering all transit services and facilities in the metropolitan San Diego area. This plan is a policy and planning guide for all public transit;
- the annual preparation and updating of a transportation improvement program (TIP). The TIP is a five year program of all transportation projects including public transit, highways, streets and bicycle routes that are to be implemented in the San Diego metropolitan area;
- administration of all claims made by local transit operators for their share of the State sales tax allocated to public transit via the State Transportation Development Act (TDA).

Financial responsibilities vested in the MTDB include:

- administration of the funding of short range planning expenses through the TDA monies;
- construction of the San Diego trolley line using State funds derived from a percentage of the gasoline tax set aside for rail transit development;
- administration of TDA funds used to purchase the fleet of rail cars for the San Diego trolley line;
- Double tracking the San Diego trolley line using funds from a State Bill allocating money for transportation planning and development;
- administration of State Transit Assistance Funds (STAF) allocated to the MTDB.

The funding picture for public transit in the San Diego area is quite complex and involves varies State agencies, municipalities, regional agencies, as well as UMTA. Funds flow through the Central Planning Organization (CPO), the MTDB, the eight cities and the County to the operators of transit service in the region. As discussed in the following section of this report, the MTDB has taken several successful steps in improving administrative, planning, funding and operational coordination with the region.

CONDITIONS PRIOR TO FARE INTEGRATION

Until 1979, only two fixed route bus operators (San Diego Transit Corporation and Chula Vista Transit) provided service in the MTDB area of jurisdiction. Both operators had flat fares including a variety of special purpose fares and passes. Transfers between the operators were free.

Beginning in 1979, a number of new public transit agencies were created by cities in the region, due mostly to the increased availability of State and Federal operating subsidies. By July 1, 1981, when the Uniform Fare Structure was adopted within the MTDB area of jurisdiction, five fixed route bus operators (San Diego Transit, Chula Vista Transit, National City Transit, Strand Express and County Transit System) and six dial-a-ride operators provided service in the MTDB area. The San Diego trolley started service in July, 1981. Appendix F provides a description of many of these services and Appendix G provides some representative operating statistics. Exhibit 10.1 provides a map of the MTDB area and indicates generally the coverage provided by the fixed route transit systems.

In 1979 there was very little service and fare coordination between the operators. In response to this situation the MTDB initiated an effort to consolidate and rationalize services and fares because:

- there was a growing public concern that the existing method for allocating regional public transit operating subsidies was not resulting in service that equitably addressed the needs of the region;
- the increase in operating subsidies for public transit in the late 1970's led to an increase in public demand for integration and improvements of metropolitan area transit services;
- the scheduled 1981 opening of the first light rail transit line in the region, designed and constructed by MTDB and operated by an MTDB subsidiary company, San Diego Trolley Inc., further attributed to the need to coordinate service and fare structures to avoid service duplication and to establish a procedure for area transit patrons to make a trip conveniently on more than one mode of public transportation.

The results of the MTDB efforts was to vest in the MTDB control of the financing of those transit services having a regional orientation. Exhibit 10.2 describes three classifications of transit service, with the first two types being regional in nature. They must be closely integrated and are both essential for regional mobility by transit. Local transit services, while important for access or egress from the metropolitan and arterial services, are more of a local concern. Thus, the MTDB was granted control of subsidy funding to these first two categories of service. In addition, the three functional categories were used as the basis for the fare policies included in the uniform fare structure.

Exhibit 10.1

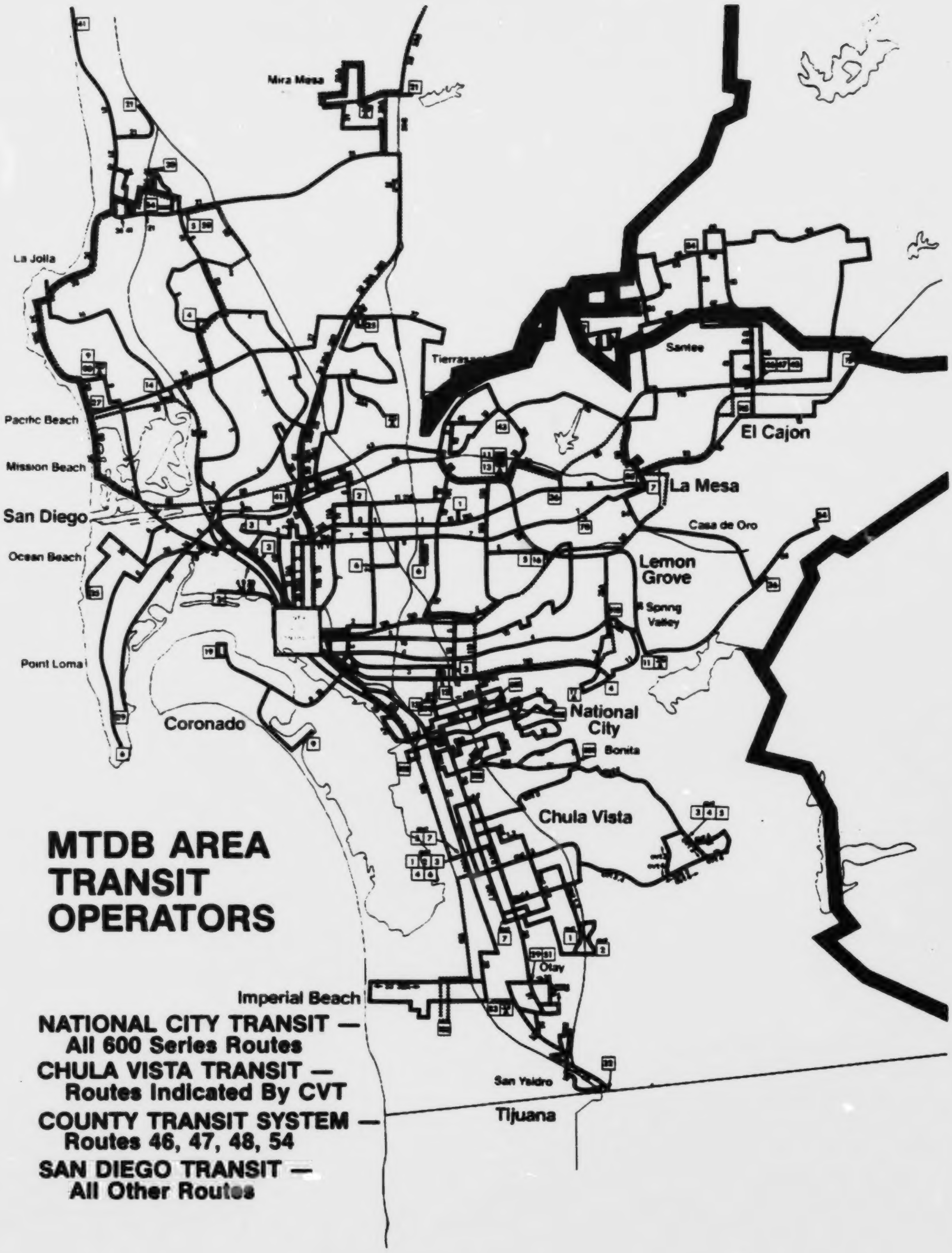

Mira Mesa
La Jolla
Tierrasa
Santee
Pacific Beach
El Cajon
Mission Beach
La Mesa
San Diego
Casa de Oro
Ocean Beach
Lemon Grove
Spring Valley
Point Loma
National City
Coronado
Bonita
Chula Vista
MTDB AREA TRANSIT OPERATORS
Otay
Imperial Beach
NATIONAL CITY TRANSIT — All 600 Series Routes
CHULA VISTA TRANSIT — Routes Indicated By CVT
COUNTY TRANSIT SYSTEM — Routes 46, 47, 48, 54
SAN DIEGO TRANSIT — All Other Routes
San Ysidro
Tijuana

EXHIBIT 10.2

CLASSIFICATION OF REGIONAL TRANSIT SERVICES

FUNCTIONAL CLASSIFICATION	RELATIVE SPEED	STOPS ALONG ROUTE	PASSENGER TRIP LENGTH	TRANSFER FACILITIES
Metropolitan Trunk Routes (Red Line)	High	Few	Medium-Long	Transit Centre
Urban Trunk Routes (Blue Line)	Medium	Frequent	Short-Medium	Curb Stop/Transit Centre
Local Routes, Dial-a-Rides	Low	Frequent	Short	Curb Stop/Doorstep/ Transit Centre

OBJECTIVES OF FARE INTEGRATION

The uniform fare structure was adopted to:

- contribute to the creation of a regional rather than fragmented public transit system;
- encourage regional ridership by providing a convenient, consistent and rational fare payment method;
- improved fare equity by coordinating fares with type and (generally) distance of service.

The uniform fare structure was to be part of a regional coordinating scheme aimed at a more equitable and efficient allocation of public transit subsidies. Under adopted MTDB policies, area transit operators wishing to receive State subsidies must participate in the Uniform Fare Structure, Master Transfer Agreement and Ready Pass (monthly pass) Agreement. These agreements are discussed more fully in the following section of this report.

IMPLEMENTATION OF FARE INTEGRATION

MTDB, as the State legislated regional transportation coordinating agency, took the lead in establishing fare integration and the Uniform Fare Structure. The initial steps toward the adoption of an integrated fare and the Uniform Fare Structure commenced in 1979 following the rationalization of transit financing as discussed above. To implement the Uniform Fare Structure, the following procedures were established:

- a "Master Transfer Agreement" was adopted by all operators in the area. This agreement establishes transfer fares and procedures among the operators. The agreement is updated every year;

- a "Regional Ready Pass Agreement" was adopted by all operators in the area. This agreement establishes operator and agency responsibilities for the printing, distribution and sale of the passes. In addition, the agreement establishes a formula for disbursements to each operator of revenues collected from the sale of passes.

The Master Transfer Agreement, which is between the MTDB and the San Diego Association of Governments (SANDAG) (representing the municipalities who receive and disburse State TDA funds - the largest single government contribution to operating subsidies) and all operators receiving TDA operating funds, sets out the basis for passenger transfer between carriers. The agreement establishes six levels of service representing generally the range of fares, from level 1 at a 50¢ single adult fare to level 6 representing the highest fare for commuter and rural services. The agreement provides that passengers transferring between equal levels of service and from higher levels of service to lower levels of service shall pay no transfer charge. However, passengers transferring from a lower to a higher level of service must pay the difference between the fares associated with the lower and higher level of service for that category of rider. The 10 operators entering into this agreement include:

- Chula Vista Transit
- County of San Diego;
- El Cajon Express;
- La Mesa Dial-a-Ride;
- Lemon Grove Dial-a-Ride;
- National City Transit;
- North County Transit District;
- San Diego Transit Corporation;
- San Diego Trolley Inc.;
- Strand Express.

The North County Transit District does not participate completely in this agreement and charges a 25¢ transfer fee for each passenger transferring between North County Transit District routes in the North County Transit District area of jurisdiction. Transfers between dial-a-ride services and from fixed route to dial-a-ride services are exempted from this agreement, with transfers between fixed route and dial-a-ride services requiring up to a 50¢ transfer fare.

The MTDB is responsible for the printing and distribution of pre-coded and coloured transfers designating the level of service. All transfer fare revenues are collected by individual operators and are not redistributed.

The Master Transfer Agreement is effective for a period of five years during which it can be amended if changes warrant. Following the five year period, the agreement is renewable following a review by MTDB, SANDAG and each of the operators.

The Ready Pass program is administered by an agreement between SANDAG, MTDB and the seven participating operators:

- San Diego Transit Corporation (SDTC);
- San Diego Trolley Inc.;
- Chula Vista Transit;
- County Suburban Transit;
- National City Transit;
- North County Transit District (NCTD);
- Strand Express.

This agreement provides a procedure for allocating and disbursing revenues from the sale of the regional Ready Pass among the signatory transit operators making use of this pass.

The Ready Pass is a monthly pass offering unlimited riding on all local/feeder, urban and metro services operated by the seven participating carriers in two fare categories: regular and elderly and handicapped.

The principal agencies involved in the administration include the MTDB which funds jointly with the SDTC the costs associated with the distribution and sales reconciliation of Ready Passes; SANDAG, which receives rider pass usage counts from each of the operators and calculates the proportion of total pass sales revenue to be allocated to each operator based on the number of pass carrying riders by each carrier as a proportion of the total number of pass riders by all operators; the SDTC which receives all of the funds resulting from pass sales and distributes these funds to the participating carriers based on the proportions determined by SANDAG and, as indicated above, jointly funds the distribution and administration costs associated with pass sales with MTDB; and the operators who must count pass riders as they enter the bus and on a survey basis on the San Diego Trolley. It should be noted that the revenues associated with E & H pass sales include elderly and handicapped subsidies specifically provided by the City of San Diego and other local jurisdictions.

CHARACTERISTICS OF FARE INTEGRATION

The area of MTDB jurisdiction within which the Uniform Fare Structure is implemented encompasses the southwest portion of San Diego County. The service area is approximately 450 square miles and the population, mostly urbanized, is approximately 1.2 million. In addition to the six fixed route bus operators that now serve the MTDB area (County Transit System, National City Transit, San Diego Transit Corporation, San Diego Trolley Inc., Chula Vista Transit, and the Strand Express), the North County Transit District which is outside MTDB's area of jurisdiction but within San Diego County, also participates partially in the Uniform Fare Structure (as indicated on p.103, a transfer fee applies to passengers on its own routes). The Strand Express route also serves the City of Coronodo which is outside MTDB's area of jurisdiction.

The Uniform Fare Structure applies to fixed route operators only, although three of the dial-a-ride operators participate in the Master Transfer Agreement.

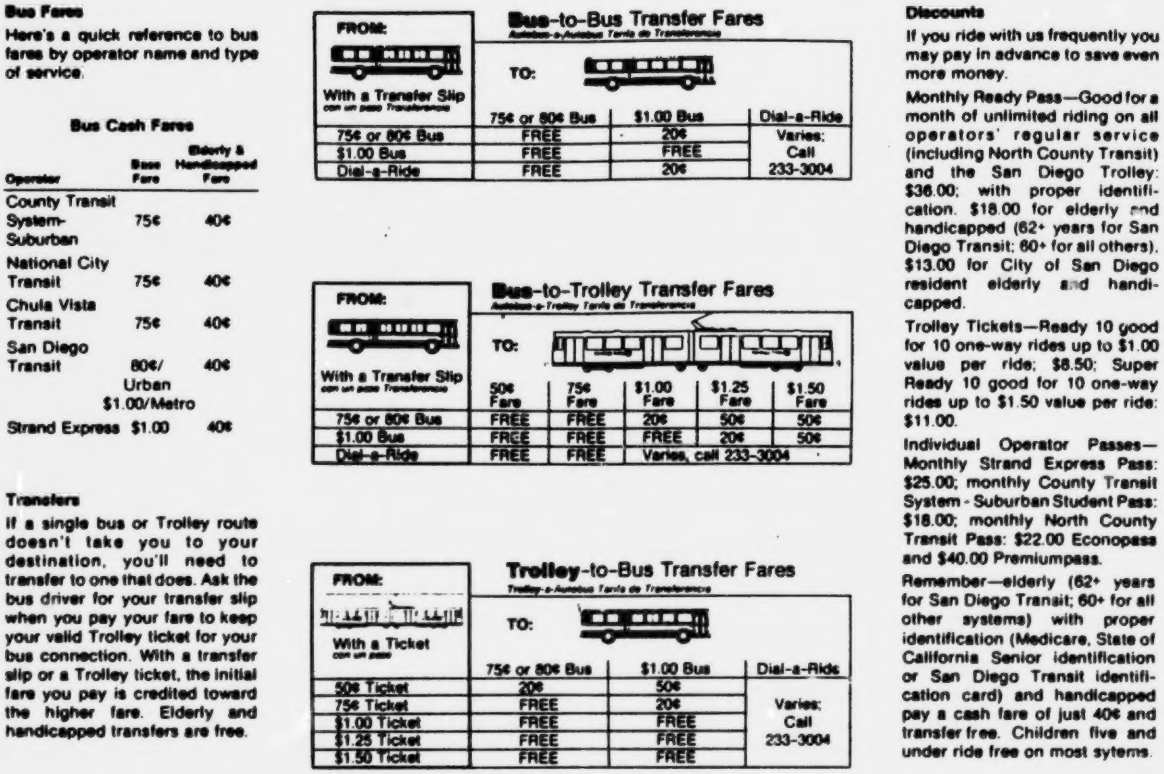
Exhibit 10.3 provides a summary of the current fare structure, including transfer fares where applicable and the costs and associated eligibility for the monthly Ready Pass and multi-ride tickets on the San Diego Trolley. Note that individual operator passes are still sold.

The local/feeder service carries people within local communities at a fare of 75¢. Chula Vista Transit and National City Transit are both local/feeder operators. The urban service fare is 80¢ and it applies to routes which carry people going both intermediate and short distances utilizing major arterial streets. Some San Diego Transit routes are urban service routes. Metropolitan or metro service carries people from one part of the metropolitan area to another and generally provides a higher speed and higher quality service. The fare on a metro route is $1.00. Some San Diego routes and the Strand Express route are considered metro services. Until July 1, 1984, the San Diego trolley fell into the metro service category. As of this date the San Diego trolley implemented a floating zone structure with fares ranging from 50¢ to $1.50 depending on the distance travelled.

The regional Ready Pass is accepted as fare payment by all operators participating in the Ready Pass Agreement. The monthly cost of this pass is $36.00. The San Diego Trolley offers three types of pre-paid fare media in addition to the regional Ready Pass. The Trolley Ready 2 ticket is good for two rides of any distance. The Trolley Ready 10 ticket is good for 10 rides of up to $1.00 value per ride and is priced at a 15% discount to the full fare value. The Super Ready 10 ticket is good for 10 rides of any distance on the San Diego Trolley and is priced at approximately a 25% discount. All trolley multi-ride tickets are valid as transfers to a bus under the Master Transfer Agreement. They cannot, however, be used as the initial fare on any bus system since on-board ticket cancellors are not available.

EXHIBIT 10.3

FARE AND TRANSFER POLICIES



Bus Fares

Here's a quick reference to bus fares by operator name and type of service.

Bus Cash Fares

Operator	Base Fare	Elderly & Handicapped Fare
County Transit System-Suburban	75¢	40¢
National City Transit	75¢	40¢
Chula Vista Transit	75¢	40¢
San Diego Transit	80¢/Urban $1.00/Metro	40¢
Strand Express	$1.00	40¢

Transfers

If a single bus or Trolley route doesn't take you to your destination, you'll need to transfer to one that does. Ask the bus driver for your transfer slip when you pay your fare to keep your valid Trolley ticket for your bus connection. With a transfer slip or a Trolley ticket, the initial fare you pay is credited toward the higher fare. Elderly and handicapped transfers are free.

Bus-to-Bus Transfer Fares

Autobus-a-Autobus Tarifa de Transferencia

FROM:	TO:		
With a Transfer Slip *con un pase Transferencia*	75¢ or 80¢ Bus	$1.00 Bus	Dial-a-Ride
75¢ or 80¢ Bus	FREE	20¢	Varies: Call 233-3004
$1.00 Bus	FREE	FREE	
Dial-a-Ride	FREE	20¢	

Bus-to-Trolley Transfer Fares

Autobus-a-Trolley Tarifa de Transferencia

FROM:	TO:				
With a Transfer Slip *con un pase Transferencia*	50¢ Fare	75¢ Fare	$1.00 Fare	$1.25 Fare	$1.50 Fare
75¢ or 80¢ Bus	FREE	FREE	20¢	50¢	50¢
$1.00 Bus	FREE	FREE	FREE	20¢	50¢
Dial-a-Ride	FREE	FREE	Varies, call 233-3004		

Trolley-to-Bus Transfer Fares

Trolley-a-Autobus Tarifa de Transferencia

FROM:	TO:		
With a Ticket *con un pase*	75¢ or 80¢ Bus	$1.00 Bus	Dial-a-Ride
50¢ Ticket	20¢	50¢	Varies: Call 233-3004
75¢ Ticket	FREE	20¢	
$1.00 Ticket	FREE	FREE	
$1.25 Ticket	FREE	FREE	
$1.50 Ticket	FREE	FREE	

Discounts

If you ride with us frequently you may pay in advance to save even more money.

Monthly Ready Pass—Good for a month of unlimited riding on all operators' regular service (including North County Transit) and the San Diego Trolley: $36.00; with proper identification. $18.00 for elderly and handicapped (62+ years for San Diego Transit; 60+ for all others). $13.00 for City of San Diego resident elderly and handicapped.

Trolley Tickets—Ready 10 good for 10 one-way rides up to $1.00 value per ride; $8.50; Super Ready 10 good for 10 one-way rides up to $1.50 value per ride: $11.00.

Individual Operator Passes—Monthly Strand Express Pass: $25.00; monthly County Transit System - Suburban Student Pass: $18.00; monthly North County Transit Pass: $22.00 Econopass and $40.00 Premiumpass.

Remember—elderly (62+ years for San Diego Transit; 60+ for all other systems) with proper identification (Medicare, State of California Senior identification or San Diego Transit identification card) and handicapped pay a cash fare of just 40¢ and transfer free. Children five and under ride free on most sytems.

Elderly and handicapped passengers pay a flat 40¢ fare on any system and may transfer to any other system free of charge. There are no other concessionary fares, except children under 5 travel free.

As indicated previously in this report, MTDB administers the Uniform Fare Structure. Each year MTDB initiates the renewal of the Master Transfer Agreement and the Ready Pass Agreement. The MTDB also covers all expenses associated with the printing of the regional Ready Passes and regional transfer slips. SANDAG administers the distribution of regional Ready Pass sales revenues in accordance with the Ready Pass Agreement. All other full and transfer fare revenues are collected by the individual operators and are not redistributed.

FARE INTEGRATION IMPACTS

The new fare structure was accepted well by passengers, since it established a rational, coordinated system for travelling in the region. Many passengers did experience initial small increases in fares for travelling on some routes.

The number of different monthly passes was reduced with the establishment of the regional Ready Pass. As noted previously some operators still offer passes valid on their systems only, but these operators also participate in the Ready Pass Agreement. The methods of administration and the distribution of regional Ready Pass fare revenue were developed with the participation of the carriers. This participation ensured that all procedures associated with the administration and redistribution of revenue would be acceptable.

The amount of State subsidies to the area operators changed very little after the adoption of the Uniform Fare Structure. However, continued receipt of these subsidies is dependent on the carrier's participation in the Uniform Fare Structure and related agreements. In addition, the carriers must meet established financial performance standards in order to receive these subsidies.

Since 1981, increases in ridership have been experienced on all systems except San Diego Transit.

Further efforts are being made to improve transit coordination within the MTDB jurisdiction. This is aimed at consolidating the transit agencies that are operating in the region. The first step in this consolidation may be to have MTDB acquire San Diego Transit and to increase MTDB responsibility over regionally significant transit services.

CURRENT STATUS OF FARE INTEGRATION

The Uniform Fare Structure and coordinated transit services which have resulted from many years of effort by the MTDB have in fact achieved most of the objectives established in 1981. Passengers can now travel and transfer among the various systems in the San Diego region as if they comprised a single system. In addition, the revenue/cost ratio of the region's carriers has increased steadily in the past several years, even though fares have not substantially increased.

Coordination efforts will continue to build on the success achieved by the Uniform Fare Structure. The MTDB and area carriers are planning to conduct a demonstration of integrated fare collection equipment in the next several months. The purpose of the demonstration is to test the potential of a more extensive, coordinated pre-paid fare system. The demonstrations to be undertaken consist of:

- an integrated magnetic card reader on both the buses and at trolley stations;
- a multi-ride ticket canceller on the buses similar to the ones that are now available at trolley stations.

MTDB is pursuing the integrated fare collection equipment to increase fare revenues in the MTDB area and to further enhance passenger convenience in the regional transit system. The obvious restraints to acquiring integrated fare collection equipment is the capital cost to purchase the equipment by the operators and the MTDB.

COMMENTARY

The MTDB has made some major strides in effecting coordination between diverse transit operators who had different fare structures, provided different transit roles and served different geographic areas within the region.

San Diego Transit, carrying approximately 19 million annual passengers, is the largest carrier. Revenue/cost ratios range from approximately 10% for the County Transit Suburban Bus System to 78% for the San Diego Trolley, with San Diego Transit achieving a 32% R/C ratio.

The myriad of funding arrangements, particularly for operating funds, distinguishes the MTDB area from the Toronto region. Also responsibilities for various aspects of administration are shared between the MTDB, SANDAG and the operator and therefore coordinated control of planning, financing and operations is difficult to say the least.

Despite this, however, they have achieved considerable success in developing cooperative arrangements between operators which effectively integrates fares for both single ride and period pass passengers. The details of these agreements would be of interest to the Ministry and the operators in this region if similar arrangements are considered for implementation here.

APPENDIX A

SURVEY FORM

ONTARIO MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

QUESTIONNAIRE

FARE INTEGRATION IN PUBLIC TRANSPORTATION

The objective of this survey is to obtain a detailed understanding of the public transportation fare integration scheme operating in your jurisdiction. The results of this experience will be incorporated in our review of fare integration schemes and will greatly assist us in developing and evaluating schemes for fare integration in the Metropolitan Toronto commuter region. The questions below are defined in a general way, using examples to illustrate the types of information which we are seeking.We hope that this format will encourage a comprehensive of response reflecting the particular issues and conditions associated with the fare integration scheme in your area.

1. We would like to understand the conditions that existed prior to implementing your fare integration scheme, particularly those conditions which prompted fare integration and fare policy coordination. For example:

   o how many public transportation systems were there and what types of transportation service did each provide?

   o how many passengers were carried annually by each system?

   o how many vehicles were in each fleet?

   o what problems were experienced e.g. duplication of services, fare inequity, passenger inconvenience?

   o how were fares charged for trips crossing municipal or service area boundaries?

- how were the transit services and fare collection systems administered?

2. Based on the conditions that existed prior to fare integration, what were the specific objectives that the fare integration scheme was intended to achieve? For example, was it intended:

    - to reduce costs?
    - to increase revenues?
    - to make fares more equitable?
    - to simplify fare issuing and collecting procedures?
    - to increase patronage?
    - to increase passenger convenience?
    - to simplify administration?
    - to modify the amount or method of allocating public subsidies?

3. How was fare integration introduced in your jurisdiction? For example:

    - what agency took the lead and what were the roles of all participating agencies?
    - was there any opposition to the scheme and if so how was it overcome?
    - was it implemented gradually over a long period of time or all at once?
    - what special systems, procedures or fare collection equipment were required to implement the fare integration scheme?
    - was the scheme considered to be a radical change at the time of implementation or was it considered a modest modification to existing policies and fare collection systems?

4. Please describe the fare integration scheme that is now operating in your community/region.

   - population served and service area size;
   - fare structure and fare policies (ticket types, zone or flat fare, special discounts, etc.);
   - number of public transportation operators to which it applies and the share of total passengers which each now carries;
   - the method of administering the fare integration scheme, including the responsibilities of the agencies which are participating;
   - the method by which fare revenues are distributed to participating public transportation operators, including any specific formulas for this purpose;

5. We are interested in knowing the impacts which the fare integration scheme has had on the affected government agencies, the public transportation operators and the passengers. For example:

   - how well did passengers accept the changed fare structure and fare collection systems?
   - did it involve a reduction in fares for some passengers and increases for others?
   - did it result in fewer fare levels, fewer ticket types, different transfer procedures, or different fare media?
   - what was the impact on public transportation patronage?
   - has it changed the number and types of public transportation services, and if so how?
   - were the methods of administration and distribution of fare revenue readily accepted by the operators of the affected public transportation services?

- what effect did it have on the amount of subsidies paid to the public transportation operators?
- were there any other impacts on the public transportation system, the passengers or the administration?

6. We are interested in knowing the current status of the fare integration scheme. For example:

    - has it achieved the objectives which were set out for it, and if not which aspects still need improvement?
    - what is its suitability in terms of today's passenger, financial and operating conditions?
    - what plans are being made or considered at this time to change the fare integration scheme over the next several years?
    - if changes are being considered or planned, what are the reasons for these changes and what results do you expect to achieve with their implementation?
    - what are the restraints to implementing changes and do you expect to be able to overcome these?

Any specific or general information or reports on the subject, in addition to your responses to the above questions, which will further amplify our understanding of your fare integration scheme would be greatly appreciated.

APPENDIX B

CURRENT LT FARE STRUCTURE

CURRENT FARE STRUCTURE

Ordinary Fares

Underground

- 5 zones. Concentric rings approximately 3 miles apart radiating from the boundary of the central area (zone 1). Single fares are:

1 Zone	2 Zones	3 Zones	4 Zones	5 Zones
30p*	50p	80p	100p	130p

* 40p in Zone 1.

- For two-zone journeys of less than 2 miles the one zone fare is charged.
- No charge is made for re-entry to a zone, for example a journey from zone 2 through zone 1 and back into zone 2 is 50p.
- Train to train transfers are allowed at no extra cost.
- Return tickets are available at twice the price of the single fare and are valid only on the day of issue.
- Cheap Day Return tickets which offer a discount of up to 30% against the price of two single tickets can be purchased for two or more zones (not available before 10.00 Monday to Friday) and are also valid only on the day of issue.

Bus

- 3 zones. The three outermost Underground zones (3a,3b,3c) are merged into one for bus. Fares are:

1 Zone	2 Zones	3 Zones
30p*	50p	70p

*40p in Zone 1.

- For journeys up to about 1 mile (3/4 mile in Zone 1) the fare is 20p.
- No charge is made for re-entry to a zone.
- Each bus to bus transfer is deemed a separate journey and charged accordingly.
- No return tickets are issued.

There is no facility for bus/train transfer on single tickets.

Travelcards

Travelcards are season tickets valid for travel on both bus and Underground throughout the zones of availability. Travelcards can be purchased for any combination of adjacent zones. Rates are

	Central Zone	1 Other Zone	2 Adjacent Zones	3 Adjacent Zones	4 Adjacent Zones	All Zones
Weekly (7 consecutive days)	£4.00	£2.80	£4.70	£7.40	£9.40	£12
Monthly	£15.00	£10.70	£18.00	£28.30	£36.00	£46
Quarterly	£43.70	£30.60	£52.00	£80.00	£103.00	£132
Annual	£150	£114	£190	£290	£380	£480

- Travelcards can be purchased for one week or any period between one month and one year.
- Travelcards valid in zone 3a,3b,or 3c are valid throughout the entire Outer bus zone.
- Travelcards which do not include zone 1 availability are valid on Underground only in one sector (North, South, East or West) but throughout the relevant bus zone. (This is a fraud prevention measure)

Bus Passes

Bus-only passes are issued for Inner, Outer or Inner and Outer zones. They cost the same as Travelcards and were introduced to to simplify the range of tickets to be handled at bus sales outlets, by obviating the need for them to be aware of the Travelcard sector arrangements and division of the bus Outer zone which apply only on the Underground. They are available for 1 week, 1 month or 1 year.

Photocards

A photocard (photographic identity card) is required by holders of Bus Passes and Travelcards. Photocards do not have to be renewed and are free of charge, although the passenger must provide a suitable photograph. Photocards are a fraud prevention measure.

Tourist Tickets

The London Explorer is a ticket aimed primarily at the tourist market. It is valid in all the zones on both bus and Underground and can be purchased for 1,3,4 or 7 day. Included in the price is a book of vouchers giving discounts at various museums, restaurants, tourist attractions etc. A photocard is not required with a London Explorer

Daily Tickets

- A One-Day Travelcard costing £2 valid throughout all zones on bus and Underground. It cannot be purchased before 10.00 Monday to Friday.
- A 'Red Bus Rover' costing £1.80 is valid on bus only throughout all zones. It is valid from 05.30.

APPENDIX C

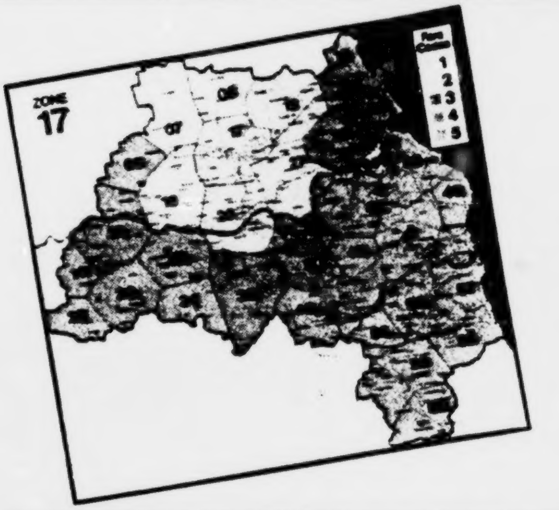
TYNE & WEAR FACT SHEET ON FARES AND TICKETING

Tyne and Wear Transport

FACT SHEET

No.2 May 1984

Fares and Ticketing



Introduction

Public transport fares in Tyne and Wear are charged in accordance with the policies of Tyne and Wear County Council. They apply to all bus services in the County, Metro, the British Rail line between Newcastle and Sunderland, and the North Shields – South Shields Ferry.

Under the 1968 Transport Act the P.T.E. has the duty to integrate all forms of public transport within the County. This obligation has been met by the planning and implementation of a unified transport system based on a 54 km light rapid transit system marketed as "Metro". Bus and Metro services do not parallel each other; buses meet Metro at purpose-built transport interchanges. Through-ticketing between modes was seen to be a basic requirement if passengers were not to be inconvenienced or be forced to pay a greater fare upon changing.

The Zonal Fares System

Before through ticketing could become feasible there was a need to standardise and simplify the existing fares structure.

At a Fares Revision in November 1979, the opportunity was taken to replace the existing fares structure. Until then fares had been charged on a traditional "stage" system. For the new structure, the County was divided for fares purposes into 32 zones, each being an approximate hexagon about 5 km across. The choice of this size and shape of zone was based upon the geography of the County, the existing fare-scale, (particularly that applying to longer journeys) and the need to tailor the zones to the requirements of Traveltickets. Fares for short distances (up to 5 km) are charged in 1 km - stages. Fares for journeys over five stages or involving a change of mode are charged on the zonal system. The maximum fare is currently that for five zones travel, journeys greater than this costing only the five zone fare.

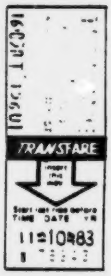
This system has meant that only nine fare values are required to cater for all possible journeys in Tyne and Wear.

Ticket Types

a) Single Journeys

Single fares are charged according to the distance travelled and calculated using the stage and zonal system.
They are only valid for travel on one vehicle for the journey being made at the time of purchase. Tickets are bought either on buses or from Metro ticket machines. Over 50% of all journeys made on local public transport in the county are made using single journey tickets.

b) Transfares



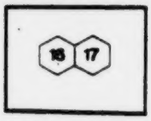
"Transfares" is the name under which through -tickets are marketed. They are valid for interchange journeys allowing the use of one or more buses and one Metro ride.
The last part of the journey must commence within 90 minutes of purchase of the ticket. Transfares may be bought from Metro ticket machines or on board most bus services in Tyne and Wear. Over 7½ million journeys per year are made using Transfare tickets.

TRAVELCARD
OFF-PEAK
TRAVELCARD

c) Traveltickets

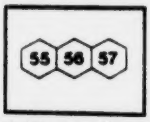
Traveltickets are season tickets which are purchased on a zonal basis. They may be bought in two zone, three zone, four zone or all-zone combinations.
Possible zone formations: –

2 Zones in a row . . .



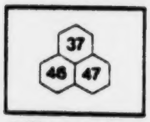
. . . that's any two touching zones.

3 Zones in a row . . .



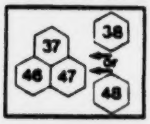
. . . that's any three zones in a line.

3 Zones in a ring . . .



. . . that's any three zones where each one touches the other two.

4 Zones in a ring . . .



. . . that's three zones in a ring plus any adjacent zone.

and the ever popular, 'All Zones' or Countywide ticket.

"All-Day" and "Off-Peak" types are available for periods of one week or four weeks. Additionally, All-Day tickets for one year may be purchased.

A survey of Travelticket sales taken in November, 1983, produced the following picture. Two zone tickets took the greatest market share, 49.4% of Traveltickets sold were of this type. Next comes the all-zone ticket attracting 20% of all sales. The remaining sales were divided as follows:—
3 Zones in a Ring 19%, 3 Zones in a Row 9.1% and 4 Zones 2.5%.

Approximately three quarters of all Travelticket holders choose the All-Day ticket, the remainder holding Off-Peak tickets.

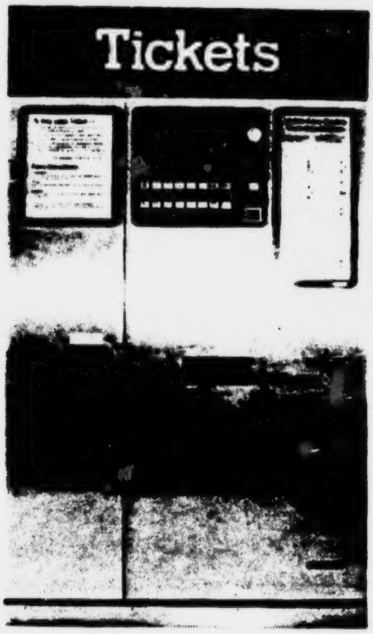
Revenue from Traveltickets accounts for around 25% of total ticket revenue.
Traveltickets must be accompanied by a Travelcard, which bears a photograph and signature of its holder. They can be obtained from 17 Travelcentres throughout Tyne and Wear.

Ticket Equipment

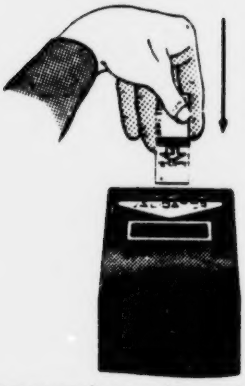
a) Metro

Single tickets are sold from self-service Ticket Issuing Machines (TIM's), manufactured by Crouzet.
Tickets are magnetically encoded to operate Metro entry gates and are printed with information including zone of purchase, station of purchase, fare paid, date, time of expiry, class (adult/child), ticket number, and ticket machine number. This information enables these tickets to be used as Transfares.

Metro entry gates read the magnetic codes on Metro single tickets and On-bus issued Transfare and allow them to be used once only. They also check Traveltickets for zone availability and expiry date.



1000 5 84 Issued by Tyne and Wear Passenger Transport Executive
Cuthbert House All Saints, Newcastle upon Tyne NE1 2DA



b) On-bus

Single tickets are normal paper Almex tickets. Drivers carry pre-encoded stocks of Transfare tickets, which are printed with fares information by insertion into the Almex machine. Passengers validate (i.e. add time of expiry) by inserting the ticket into a validator immediately behind the driver.

CURRENT FARE SCALES (MAY, 1984)

	Code		Adult	Child
Stages within one Zone	A	1 kilometre	14p	5p
	B	2 kilometre	14p	5p
	C	3 kilometre	20p	5p
	D	4 kilometre	26p	5p
Journeys over 4 kilometres are charged on a zonal basis	1	Zone	32p	5p
	2	Zones	37p	5p
	3	Zones	45p	5p
	4	Zones	58p	5p
	5	Zones	70p	5p

Travelticket Prices

All Day

TYPE	WEEKLY	4 WEEKLY	ANNUAL
2 IN A ROW	£2.50	£ 9.20	£101
3 IN A ROW	£2.70	£ 9.90	£109
3 IN A RING	£3.80	£13.60	£150
4 IN A RING	£4.00	£14.30	£157
ALL ZONES	£5.00	£16.90	£186

Off Peak

TYPE	WEEKLY	4 WEEKLY
2 IN A ROW	£1.80	£5.40
3 IN A RING	£2.00	£6.00
3 IN A ROW	£2.20	£6.60
4 IN A RING	£2.40	£7.20
ALL ZONES	£3.00	£9.00

Fares Evasion

A major requirement of the Rapid Transit Scheme was that stations should be unmanned. Entry to the system is controlled by turnstiles which are unlocked by valid tickets, invalid tickets being rejected. Overriding and "jumping the barriers" are countered by ticket scrutiny by Mobile Inspectors and high penalties. These penalties include:

- excess fares (charged from the point of expiry of the ticket to the completion of the journey).
- Standard fares of £3 adult and £1 child (where no valid ticket is held and it is considered there may be intent to avoid payment).
- withdrawal of travelticket and card if misused.
- prosecution

In a recent 6 month period, 126 cases of fare evasion were heard in court of which 113 were proved and fines imposed.

APPENDIX D

MTT PUBLIC ADVERTISEMENT OF 1974 FARE CHANGES

MTT —IMPORTANT NOTICE—

TO ALL METROPOLITAN BUS, RAIL AND FERRY PASSENGERS

As from Sunday 4th August, 1974 the Trust will introduce a completely new but simple fare schedule. As from that date also, metropolitan bus and train tickets will be interchangeable.

30 CENT FARE

For a distance of approximately 30 kilometres from the Perth G.P.O., patrons will be able to travel on a flat 30 cent fare. The boundary for this fare is shown on the map below.

Patrons holding a 30 cent ticket can change from bus to bus, bus to rail, rail to bus and bus to ferry and travel any distance within the stated boundary as long as the last change can be made within TWO HOURS of the time shown on the ticket. The time will be imprinted on tickets (as shown in sample) to the nearest quarter of an hour.

Patrons may return on the same ticket as long as the two hour qualification is met. The time on the ticket will be the sole factor in judgment and NOT the timetabled departure times of buses or trains.

15 CENT FARE

A 15 cent fare will be available for ONE section travel or within the city block bounded by King Street and Victoria Avenue in an east-west direction and Wellington Street and Barrack Street Jetty in a north-south direction (City Clipper services are still free).

The 15 cent fare is for one trip only and does NOT allow for transfer travel.

45 CENT FARE

A 45 cent fare will apply for a journey crossing over the 30 kilometre boundary to a point within the No. 2 zone boundary (approximately 45 kilometres) or vice versa. The 15 cents fare for one section and 30 cents for more than one section will apply for travel which is wholly within the No. 2 zone.

The 45 cent fare has the same transfer facilities as the 30 cent fare. The transfer also has to be made within the TWO HOURS of the time shown on the ticket.

OVERLAPPING ZONE

To enable those patrons who wish to journey from the outer zones to a point just inside the inner zone boundary or vice versa, an overlapping area has been fixed as shown on the map. The adult fare from No. 2 zone to a point within the overlapping zone will be 30 cents.

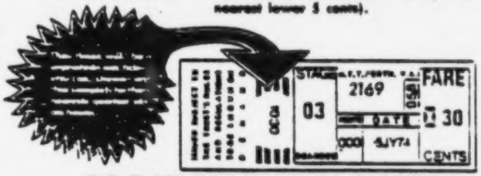
OUTER AREAS

Mandurah (No. 4 zone) and Yanchep (No. 3 zone) ARE NOT considered to be within the metropolitan area and special fares of 75 cents and 60 cents respectively will apply.

CHILD'S FARE

This will be half the adult fare (to the nearest lower 5 cents).

PLEASE KEEP THIS ADVERTISEMENT HANDY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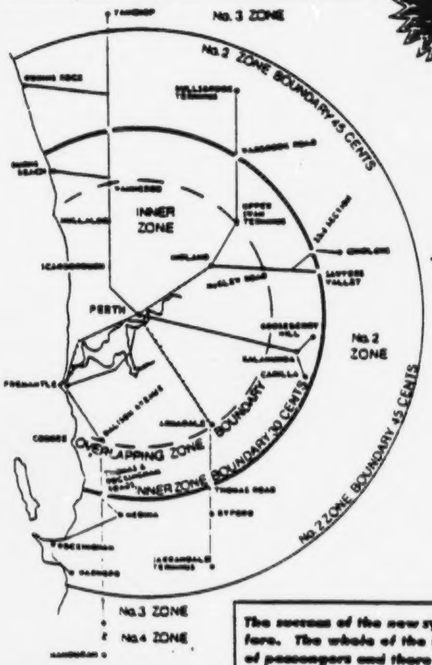


28 DAY PERIODICAL TICKETS

A ticket valid for 28 days can be purchased for $12 to travel ANYWHERE at ANY TIME within the 30 cents and 45 cents zones. Students periodical tickets will be available for $9.00 for travel within these two zones.

Periodical tickets costing $24 for adults and $18 for students will be available to Mandurah residents. Special outer zone tickets will also be available on application.

Tickets may be purchased at Perth Central Bus Station, M.T.T. Information Bureaus at 125 St. George's Terrace and Cantonment Street, Fremantle, all manned railway stations and by mail. They will also be available from existing newsagency outlets at Kelmscott, Maddington and Mosman Park.

SCHOLAR'S CONCESSIONS

Term Tickets — available to full time scholars attending approved day schools for transfer travel between home and school on school days only to 6.30 p.m. Price: $6.00 per term.

5 cent Concession Fare — The existing 5 cents scholars concession will be extended to rail.

The success of the new system is dependent on passengers tendering the correct fare. The whole of the system will also depend a great deal upon the honesty of passengers and there will be severe penalties for wilful fare evasion.

METROPOLITAN (Perth) PASSENGER TRANSPORT TRUST

APPENDIX E

DESCRIPTION OF MAJOR TRANSIT SYSTEMS OPERATING IN THE SAN FRANCISCO BAY AREA

DESCRIPTION OF MAJOR TRANSIT SYSTEMS OPERATING IN THE SAN FRANCISCO BAY AREA

B. The Transit Systems

1. Alameda-Contra Costa Transit District. This was the first multi-county transit district to be established in California. It took over the operations of Key System Transit Lines in 1960 in what is now called Service District No. 1, extending from the north limits of Richmond to the south limits of Hayward. In 1974, the cities of Fremont and Newark voted to annex to AC Transit, and are designated Service District No. 2. The two service districts are separated by Union City (pop. 36,000, area 15 sq. mi.), which voted down the annexation proposal, and now operates a modest minibus service of its own.

AC Transit offers local and express service in the area described above and across the San Francisco-Oakland Bay Bridge to the Transbay Terminal at the edge of the San Francisco central business district. AC Transit has direct property taxing powers; however, the productivity of this tax has been reduced drastically by Proposition 13 of 1978. As mentioned above, it is eligible to receive subsidies from the AB 1107 program and from bridge toll revenues. AC Transit is governed by a board of directors, five of whom are elected by wards and two at large.

Under various contracts AC Transit operates "BART Express" buses in Alameda and Contra Costa counties and local services for the three Contra Costa transit authorities. Contracts are written to reimburse AC Transit for full cost of operating the services; resources used are local TDA funds in most cases. Residents in areas served by these contracts do not have the franchise to vote for AC directors, but neither are they subject to AC's property tax levy.

2. Golden Gate Transit. This service, which includes bus routes and two ferry lines, is operated by the Golden Gate Bridge, Highway, and Transportation District, which is also responsible for the Golden Gate Bridge and its approach highways. The District comprises San Francisco, Marin, Sonoma,

most of Napa, Del Norte, and a part of Mendocino counties, but transit service is operated only in the first three of these. Trunk line intercounty service between San Francisco and cities as far north as Santa Rosa is the District's direct responsibility. Under contract with the non-operating Marin County Transit District it also furnishes additional local services in that county. In effect, therefore, all transit service in Marin is unified under the Golden Gate banner. In Sonoma County, however, municipal services operate in Santa Rosa as well as in outlying cities which are not on the Golden Gate transit network.

The District has no taxing power. As a matter of policy it has used excess toll revenues to subsidize bus and ferry operating costs, setting tolls sufficiently high to enable it to do so. (The District also operates club buses and van pools.) It is governed by a board of 19 directors, nine of whom represent San Francisco and the other ten the counties to the north. The directors are appointed by their respective county boards of supervisors or, in the case of one of San Francisco's representatives, by the mayor of that city.

3. Municipal Railway of San Francisco. The "Muni" is the oldest publicly owned transit system in the United States, having been created in 1912 to build the Twin Peaks and Sunset streetcar tunnels and to compete against the then existing private companies. It now operates all local service within San Francisco (the BART route excepted) and in a very small, but densely populated section of Daly City in northern San Mateo County.

Technically, the Muni is governed by the San Francisco Public Utilities Commission (not to be confused with the California Public Utilities Commission). The commissioners are appointed by the Mayor of San Francisco. The Board of Supervisors retains certain powers, such as adopting the budget and approving fare changes set by the SFPUC. Traditionally, general funds from the city budget have contributed a major share of Muni's operating budget; however, since the passage of Proposition 13 this support has diminished. The Muni is one of the three agencies receiving special subsidy funds from the one-half percent sales tax and from bridge tolls.

4. San Mateo County Transit District. "Samtrans" was created to take over a mixture of previously existing services, including some trunk lines

operated by Greyhound and local services of several cities. It has expanded this network and the quantity of service considerably.

Samtrans' board of directors is the Board of Supervisors of the county. The District does not have taxing powers and has not received general county funds for its support. Neither does it have access to special sales tax or toll bridge funds. Of the seven major systems it is therefore the only one entirely dependent on TDA and UMTA Section 5 subsidies. However, Samtrans is by far the major claimant of TDA funds in the county.

5. Santa Clara County Transit District. Santa Clara County Transit's history parallels that of Samtrans, but it predates the latter by several years. It took over municipal operations in San Jose and Palo Alto, as well as some Greyhound commute services. While the District has very limited property taxing powers, it is the beneficiary of a special one-half percent sales tax enacted by the county. It also receives the major share of county TDA funds. These sources provide it with generous subsidy support and the ability to undertake a major expansion program. The present network is many times larger than that of its predecessors and is still growing. Its routes connect with AC Transit and BART in Fremont and with Samtrans in the Palo Alto/Menlo Park area.

The Board of Supervisors of Santa Clara County also acts as the Board of Directors of the transit district.

6. BART. The Bay Area Rapid Transit District was created in 1957 as a successor to a rapid transit commission to construct and operate a rail system in Alameda, Contra Costa and San Francisco counties. Originally three other counties were also to be part of the district, but these withdrew prior to 1962 when voters approved the bond issues for the network which has since been built.

BART is superimposed on the preexisting surface transit networks of AC Transit and the Muni. The route from Orinda to Concord is outside the territory of AC Transit; this corridor was served by a heavily patronized Greyhound bus route, a vestige of which remains until BART can increase its capacity to handle all transit commuters in this corridor.

The BART district covers all three of the counties mentioned, but the routes do not serve large portions of Contra Costa County or the Livermore Valley area of Alameda County. In response to political pressures, BART contracted with AC Transit to operate five "BART Express" bus lines in these areas. As described in sections 8 and 9 below, these sometimes complement, sometimes overlap with services which have sprung up in recent years in these areas.

For engineering and land availability reasons, the Westbay BART route terminates just inside San Mateo County in Daly City. San Mateo County, however, does not contribute to BART financing (except for a minor allocation of TDA funds) and is not represented on BART's Board of Directors. In fact, BART's fare schedule includes a surcharge for trips to and from Daly City, which is stated to be in lieu of the kind of financial support which San Mateo County should have contributed to the construction of the system.

BART has the power to tax real property to pay the principal and interest on its capital debt. Since such tax objectives were excluded from the provision of Proposition 13, BART has not had to find new revenue sources for this purpose. BART can also levy a small property tax for general administrative costs, but this has suffered from the effects of Proposition 13. As stated earlier, BART does receive proceeds from AB 1107 and from bridge tolls.

The BART Board of Directors consists of nine members, all elected from wards of roughly equal population in its three counties.

7. Southern Pacific. The Southern Pacific Railroad has operated a commuter service between San Francisco and San Jose for many years. During most of this time, its schedules and fares have been controlled by the California Public Utilities Commission. Starting July 1, 1980, the California Department of Transportation (Caltrans) assumed certain responsibilities under a contract which also includes San Francisco, San Mateo, and Santa Clara counties. SP now essentially operates the service for Caltrans and the counties, who will jointly establish the schedules and fares, subject to approval from the CPUC. However, it is not yet clear how decisions will be reached, and to what extent the Southern Pacific Company or the operating personnel through their unions can modify whatever decisions are reached. Caltrans' role is that of an expeditor and financial contributor, not an operator.

8. The Contra Costa Transit Authorities. Only a small, fairly densely populated area of western Contra Costa County, primarily the cities of

Richmond and El Cerrito, is included in the AC Transit District. In the remaining urbanized areas of the county three new authorities were created in the late 1970s. All are "Joint Powers Agreement" agencies under the laws of California. All are designed to provide for unmet transit needs in areas where there was — or still is — a combination of BART Express bus routes, local contract or direct municipal operation (the latter for example, in Walnut Creek), and unserved urbanized areas.

The preexisting BART Express buses were established as extensions of the rail network into outlying areas which pay taxes to BART but are far removed from a BART station. They are financed by a combination of BART general funds and TDA grants. Recently, some route changes have been made at the request of one of the local transit authorities which was also prepared to provide the funds for the increased operating costs incurred.

These authorities, as all Joint Powers Agreement agencies, do not have taxing powers.

a. The Central Contra Costa Transit Authority. This, the youngest transit agency covered by this report, was created in 1979 to consolidate and expand transit services in the region between the Berkeley Hills and the Mount Diablo Range. As of September 1980, CCCTA operates no service, but has taken over the contracts under which AC provides service in Concord, Lafayette-Moraga-Orinda, Pleasant Hill, and Martinez. Two of BART's five express bus routes provide trunk line service through the CCCTA territory; one of these interfaces with the Livermore Valley services. Whether these routes will, or should, be absorbed by CCCTA (and whether similar consolidations should occur in the other county authorities' areas) is yet to be decided.

   CCCTA is governed by a nine-person directorate, consisting of one member of the County Board of Supervisors and eight representatives of the cities within the district. It will have considerable TDA and UMTA Section 5 funds at its disposal to carry out its program.

b. East Contra Costa Transit Authority. TriDelta Transit, the "trade name" under which this authority conducts its business, covers the north-eastern portion of Contra Costa County, including three cities and unincorporated residential, industrial, and agricultural lands. One BART express bus route provides the trunk line service through this territory to/from the Concord station. TDT has contracted with AC Transit for three local routes. TDT also operates dial-a-ride service, owning the vehicles, contracting for their maintenance with the city of Antioch and for their operations with a private management firm. Dispatching is done by TDT staff.

TriDelta Transit uses both TDA and UMTA Section 5 assistance to subsidize these operations. It is governed by a nine-member board of directors; two each are appointed by the cities of Pittsburg, Antioch, and Brentwood, and by the County Board of Supervisors; the ninth is appointed by the other eight to represent senior citizens. In general, the city appointees have been members of their respective city councils, the others nonelected citizens.

c. Western Contra Costa County Transit Authority. This Authority fills the gap to the north of AC Transit territory in the northwestern corner of the county, including two cities and considerable unincorporated stretches of urban and still-rural land. WCCTA concentrates primarily on paratransit services. It owns its vehicles and a maintenance facility, which was constructed on land belonging to the city of Hercules. A private management firm performs all operating functions — dispatching, running, and maintaining the vehicles. One BART express route operates from El Cerrito Del Norte station into the southern part of the WCCTA area as far as Pinole; discussions were under way in August 1980 to extend this line to Crockett at the northern end of WCCTA's area, replacing an extension of an AC Transit local line which presently offers weekday service on that route under contract.

WCCTA relies almost entirely on TDA funds for its subsidies; it has refused the opportunity to accept UMTA Section 5 funds in order to avoid being subjected to federal requirements which accompany such allocations. WCCTA is governed by a board of seven directors, of whom three are appointed by the County Board of Supervisors to represent unincorporated areas, and two each by the city councils of Hercules and Pinole.

9. Livermore Valley. No transit district has been created or extended to cover the Livermore Valley in eastern Alameda County. Trunk line service

in the Livermore Valley is provided by a BART express bus route to/from Hayward and Bay Fair stations. The city of Livermore also contracts with a private bus company to operate a local fixed route service in the eastern end of the valley. In this project, the valley is treated as a "zone" which could become a separate "authority", be annexed to an existing agency, or remain as it is now.

APPENDIX F

DESCRIPTION OF MTDB TRANSIT OPERATIONS (1979)

DESCRIPTION OF MTDB TRANSIT OPERATIONS (1979)

TRANSIT TRENDS IN THE METROPOLITAN AREA

The *Service Concept Element* is a plan for improvements to the existing transit services in the San Diego metropolitan area. A brief discussion of historical trends in this area will serve as a point of departure for the later presentation of transit improvements.

THE METROPOLITAN AREA AND ITS TRANSIT OPERATORS

The MTDB area of jurisdiction encompasses most of the metropolitan area within the southern part of San Diego County. This area contains more than 1.1 million people and includes the Cities of Chula Vista, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, as well as some unincorporated portions of the County of San Diego.

During FY 1978-79, seven public transit systems served this area: San Diego Transit Corporation (SDTC), Chula Vista Transit (CVT), North County Transit District (NCTD), La Mesa Dial-a-Ride, El Cajon Express, Lemon Grove Rabbit Transit, and the City of San Diego Dial-a-Ride. Two new transit operators, one in National City and one in the East County, have recently initiated services as well (Figure 2).

San Diego Transit Corporation

San Diego Transit Corporation (SDTC) is the largest operator within the MTDB area of jurisdiction. SDTC owns 373 buses, of which they operate 328, with 240 scheduled in the peak as of September 1, 1979. As of May 7, 1979, SDTC was operating 30 routes which totaled over 500 route miles. Through FY 1978-79, they have operated as many as 42 routes and as few as 27 due to cutbacks of unproductive routes and the cancellation of several shuttle routes which are now being operated by other operators. Most of the routes (21) are classified as local; there are also five express and four shuttle routes which serve activity centers or act as feeders to major routes. While a majority of the routes focus on Centre City San Diego, a number of crosstown routes also exist. To facilitate transferring, SDTC has provided and scheduled connections between many intersecting routes. As a result, many activity centers outside of the downtown area are now more accessible by transit than was the case several years ago.

Chula Vista Transit

The second largest operator in the MTDB area is Chula Vista Transit (CVT), operated as a department of the City of Chula Vista. (In August, 1979, the City of Chula Vista and the County of San Diego entered into a joint powers agreement, called South Coast Organization Operating Transit (SCOOT), to operate Chula Vista Transit.) CVT operates almost entirely within the Chula Vista city limits, with the exception of minor route mileage within the unincorporated areas of Bonita, Castle Park, and Montgomery. The service area encompasses about 25 square miles containing 75,000 residents, approximately 60,000 of whom live within one-quarter mile of a CVT route. Although the buses are leased from the privately-owned Aztec Bus Lines, CVT determines routes and schedules. CVT buses run on fixed routes according to fixed schedules. Free transferring is allowed with SDTC and National City Transit systems.

North County Transit District and East County Transit System

North County Transit District (NCTD) operates mostly in the north San Diego County area, but in late 1978 it began operation of four shuttle routes within the La Mesa, El Cajon and Casa de Oro areas. These four routes had been discontinued by SDTC. Subsequently, in mid-1979, the NCTD board of directors decided to terminate this service. In September, 1979, the County of San Diego took over this service, contracting with the Aztec Bus Lines. The new service is called the County Transit System (CTS).

National City Transit

On July 1, 1979, the City of National City initiated local bus service in National City, contracting with McDonald Transit Associates for management. The new service, called National City Transit (NCT), replaced San Diego Transit Route 12 and that part of Route 13 operating within National City. Until September 9, 1979, NCT also served Paradise Hills in San Diego; since then, San Diego Transit has developed a shuttle service for this area. NCT operates three routes, using nine standard-sized buses leased from MTDB. Transfers are free with SDTC and CVT services.

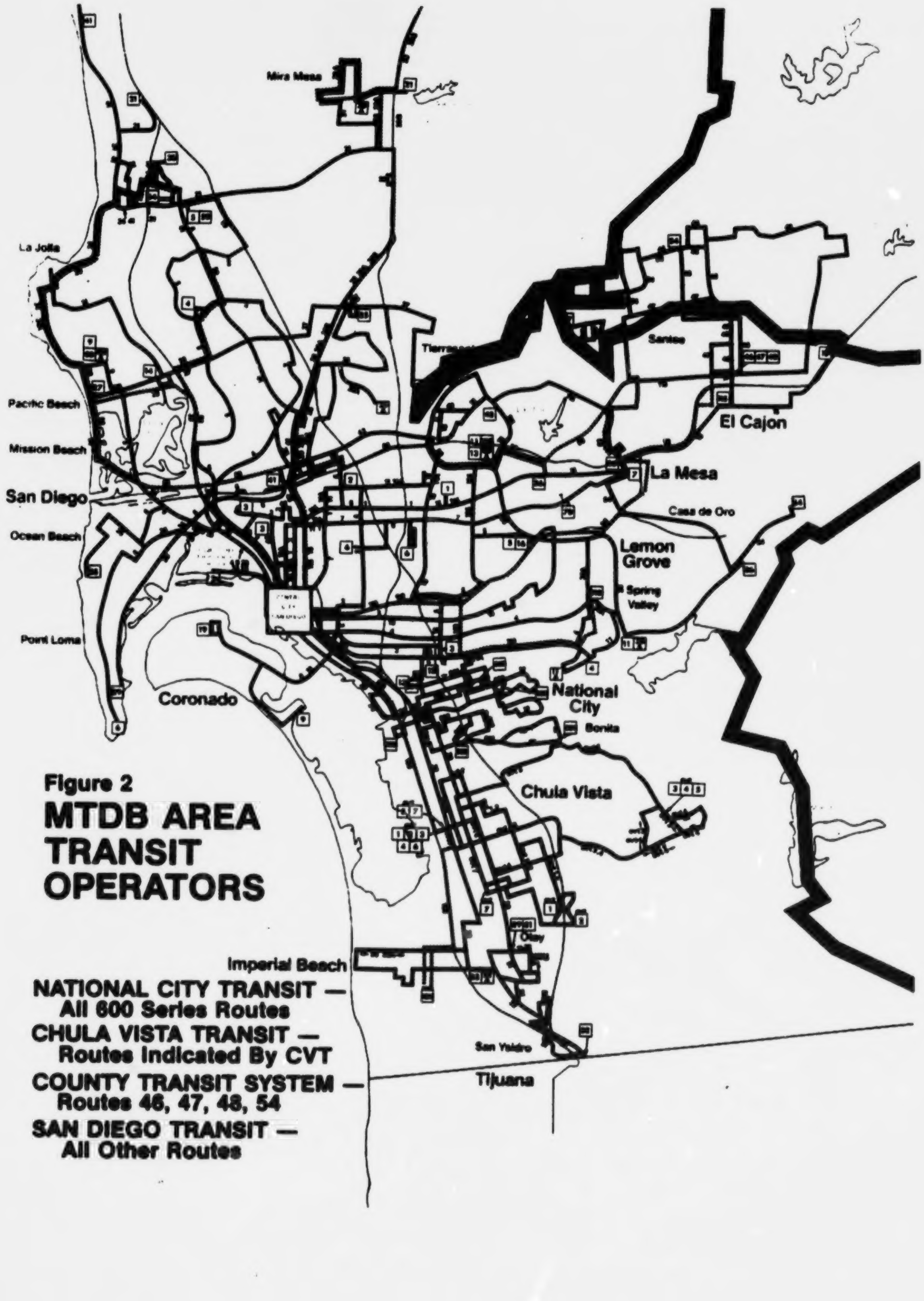

Mira Mesa
La Jolla
Pacific Beach
Mission Beach
San Diego
Ocean Beach
Point Loma
Coronado
Tierrasanta
Santee
El Cajon
La Mesa
Casa de Oro
Lemon Grove
Spring Valley
National City
Bonita
Chula Vista
Otay
Imperial Beach
San Ysidro
Tijuana

Figure 2
MTDB AREA TRANSIT OPERATORS

NATIONAL CITY TRANSIT —
All 600 Series Routes
CHULA VISTA TRANSIT —
Routes Indicated By CVT
COUNTY TRANSIT SYSTEM —
Routes 46, 47, 48, 54
SAN DIEGO TRANSIT —
All Other Routes

El Cajon Express

The City of El Cajon contracts with the Yellow Cab Company to provide demand-responsive service within the city limits. The fare is 50¢ per ride, and the taxi operator will only accept coupons, which are available at several locations throughout the community. There are no transfers with SDTC or La Mesa Dial-a-Ride, although two transfer points with La Mesa Dial-a-Ride have been established. The service is available 24 hours per day, seven days per week.

La Mesa Dial-a-Ride

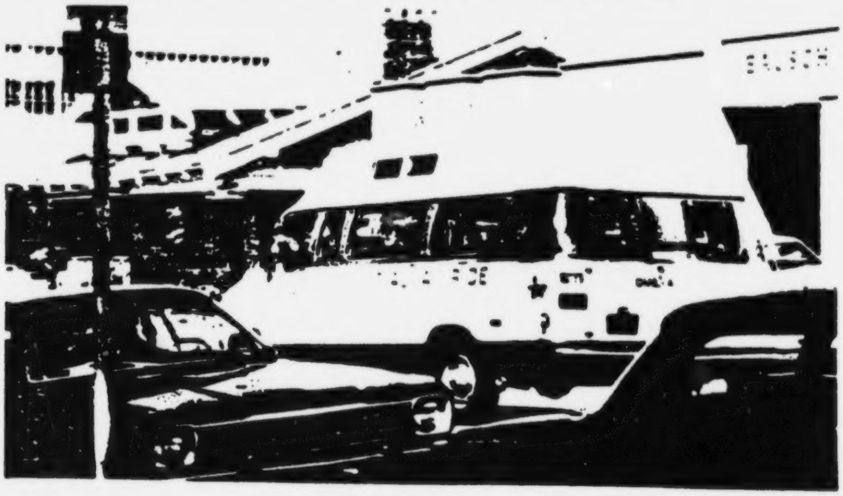
The City of La Mesa owns seven cabs and previously contracted with the Yellow Cab Company to operate these as dial-a-ride service within the city limits. This past year, however, the City of La Mesa has entered into an agreement with San Diego Transit, whereby SDTC contracts with Yellow Cab to provide the service, technically making SDTC the operator. The dial-a-ride system operates on a demand-responsive basis, with an average wait time of between 20 and 30 minutes from the time a customer calls for a cab. The service is available from 7 a.m. to 9 p.m. Monday through Friday, 8 a.m. to 6 p.m. on Saturdays, and from 7:30 a.m. to 1:30 p.m. on Sundays. The fare is 65¢ per trip, with a group-ride incentive of two passengers for $1, and 35¢ for each additional rider boarding at the same origin bound to the same destination. La Mesa Dial-a-Ride and SDTC allow free transferring between their systems, and there are two transfer points between La Mesa Dial-a-Ride and the El Cajon Express.

Lemon Grove Rabbit Transit

New service in the MTDB area is the Lemon Grove Rabbit Transit. The City of Lemon Grove contracts with the Lemon Grove and Spring Valley Cab Company to operate a demand-responsive dial-a-ride service within the city limits of Lemon Grove. The service has an average wait time of 10 to 15 minutes from the time a customer calls for a cab. It operates 24 hours per day, seven days per week.

San Diego Dial-a-Ride

The City of San Diego operates a special demand-responsive service, provided to individuals aged 60 and over and to any person temporarily or permanently disabled. The service boundaries include 319.5 square miles within the City. Equipment consists of 12 Mercedes Benz minibuses transferred from SDTC and nine vans from a previous program. The fare is 25¢ for adults; children under six who are accompanying a disabled or elderly person ride free, as do aides assisting disabled persons. A 10¢ fare is charged when passengers hold current SDTC gold passes. The system operates from 8 a.m. to 6 p.m., Monday through Friday.



APPENDIX G

OPERATING STATISTICS FOR MTDB TRANSIT OPERATIONS

OPERATING STATISTICS FOR MTDB TRANSIT OPERATIONS

COUNTY TRANSIT SYSTEM SUBURBAN BUS	Fiscal Year*	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicles Miles
	78-79	$ 118,000	$ 23,000	90,000	92,000
	79-80	990,035	103,970	229,465	558,601
	80-81	1,525,323	160,514	387,433	782,985
	81-82	1,565,869	219,311	465,936	825,490
	82-83	1,625,970	236,717	465,047	812,498

* FY 78-79 figures are only for those parts of routes operating within the MTDB area. In subsequent years figures are systemwide due to general unavailability of data for MTDB area.

COUNTY TRANSIT SYSTEM EXPRESS BUS	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicles Miles
	81-82	$ 207,813	$ 61,406	37,857	65,550
	82-83	297,599	110,750	68,202	91,257

NATIONAL CITY TRANSIT	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicles Miles
	79-80	589,521	61,706	185,889	277,393
	80-81	482,807	90,259	250,142	234,791
	81-82	542,010	135,846	280,683	248,023
	82-83	621,867	165,153	289,823	263,612

SAN DIEGO TRANSIT	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicles Miles
	70-71	$ 7,866,267	$ 5,301,324	15,515,751	7,050,975
	71-72	8,115,232	4,937,983	13,015,770	7,598,459
	72-73	10,629,902	4,642,071	18,519,042	9,300,881
	73-74	11,916,498	5,728,459	24,567,011	10,513,922
	74-75	16,396,044	6,370,606	27,629,963	12,613,269
	75-76	20,870,193	7,793,339	29,316,157	13,144,353
	76-77	25,632,894	7,941,986	30,067,931	13,484,799
	77-78	27,030,538	8,443,753	29,920,024	13,036,731
	78-79	26,428,762	9,157,016	27,282,980	11,085,172
	79-80	30,135,825	12,190,300	27,913,111	11,550,395
	80-81	33,913,545	13,991,103	26,306,208	11,568,481
	81-82	32,429,860	13,645,922	21,118,678	9,678,495
	82-83	32,635,372	12,429,875	18,525,895	9,497,969

SAN DIEGO TROLLEY	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicles Miles
	81-82	$ 3,453,804	$ 2,787,175	3,659,185	1,004,861
	92-83	4,101,325	3,037,204	4,044,989	1,268,276

SOUTH COAST ORGANIZATION OPERATING TRANSIT (CHULA VISTA TRANSIT)	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicle Miles
	71-72	$ 67,458	$ 3,412	N/A	N/A
	72-73	72,149	4,105	N/A	N/A
	73-74	110,906	12,344	42,432	289,782
	74-75	176,038	55,315	189,120	279,156
	75-76	204,739	54,905	278,582	265,000
	76-77	307,555	69,619	282,892	397,000
	77-78	400,239	80,277	350,780	480,300
	78-79	690,228	92,167	410,415	467,520
	79-80	900,922	159,415	491,698	500,200
	80-81	1,076,974	189,541	428,478	488,408
	81-82	1,058,417	230,499	491,652	485,099
	82-83	1,155,992	260,630	493,228	510,220

STRAND EXPRESS JOINT POWERS AGENCY	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicle Miles
	79-80	$ 87,089	$ 10,196	$ 17,189	21,890
	80-81	208,504	67,132	110,204	132,420
	81-82	375,059	146,035	111,064	165,795
	82-83	970,477	431,243	608,016	399,265

NATIONAL CITY DIAL-A-RIDE	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicle Miles
	81-82	$ 16,947	$ 1,585	1,438	7,397
	82-83	27,015	2,546	2,485	12,923

*Part year operation

EL CAJON EXPRESS	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicle Miles
	74-75	$ 226,728	$ 65,685	176,818	283,399
	75-76	272,989	77,482	210,899	331,898
	76-77	268,264	68,149	187,423	304,890
	77-78	310,802	82,860	192,920	347,954
	78-79	308,903	90,347	180,694	332,949
	79-80	407,926	100,448	192,888	359,298
	80-81	470,314	140,353	194,751	382,974
	81-82	458,588	132,123	176,166	357,785
	82-83	455,506	134,211	178,949	337,587

LA MESA DIAL-A-RIDE	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicles Miles
	74-75	$ 145,000	$ 31,100	88,869	232,400
	75-76	159,390	38,600	108,558	259,144
	76-77	157,855	29,340	84,945	227,578
	77-78	229,556	52,951	90,699	287,742
	78-79	230,255	55,220	97,548	290,899
	79-80	299,037	67,208	125,575	251,707
	80-81	404,758	105,655	146,774	328,742
	81-82	356,156	112,786	118,175	274,431
	82-83	402,883	123,717	126,174	293,425

LEMON GROVE DIAL-A-RIDE	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicle Miles
	78-79	$ 1,994	$ 1,676	3,352	3,818
	79-80	20,672	7,293	14,586	12,535
	80-81	57,228	17,020	31,495	47,596
	81-82	55,520	21,469	28,322	42,988
	82-83	67,729	24,870	32,896	49,190

CHULA VISTA HANDYTRANS	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicle Miles
	79-80	$ 107,692	$ 7,832	11,265	43,507
	80-81	169,803	18,652	25,328	84,769
	81-82	212,680	26,956	31,655	95,943
	82-83	254,360	59,496	41,466	116,353

COUNTY TRANSIT SYSTEM WHEELS	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicle Miles
	79-80	$ 121,422	$ 4,702	5,956	73,080
	80-81	188,619	23,494	21,399	171,694
	81-82	251,881	33,869	29,576	217,070
	82-83	265,998	36,942	28,932	210,926

CITY OF SAN DIEGO DIAL-A-RIDE	Fiscal Year	Total Operating Cost	Farebox Revenue	Revenue Passengers	Revenue Vehicle Miles
	75-76	$ 537,000	$ 27,300	124,000	610,000
	76-77	534,000	31,200	142,000	628,000
	77-78	567,000	31,900	145,000	563,000
	78-79	474,496	28,493	137,508	404,432
	79-80	689,162	43,047	141,960	391,086
	80-81	781,458	61,100	127,046	416,536
	81-82	700,700	79,962	97,059	318,059
	82-83	584,709	132,245	89,932	420,765

SOURCE: FY 83 data from operator year end reports. FY 82 data from Transportation Development Act Claims.
Prior years data from audit statements.

Volume

3

Ontario

Ministry of
Transportation and
Communications

TRANSIT FARE INTEGRATION IN THE TORONTO AREA - PHASE II

Future Situation Review

Volume 3

MARCH 1985

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GROUP

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

TRANSIT FARE INTEGRATION IN THE TORONTO AREA - PHASE II

FUTURE SITUATION REVIEW
VOLUME 3

IBI GROUP
in Association with
J.W. Leas & Associates
and
Paterson Planning and Research Limited

March, 1985

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1. INTRODUCTION AND SUMMARY

This report discusses potential issues which have a bearing on the feasibility of implementing some form of fare integration in the Metro Toronto Region:

- an assessment is made of the future potential demand for cross-boundary travel;
- alternative methodologies for estimating the ridership impact of fare integration schemes are reviewed and a recommendation is made on the most appropriate approach;
- a brief overview is provided of existing fare collection equipment which might be considered for use in future fare collection systems;
- the report concludes with a review of alternative approaches to revenue and cost sharing aspects of fare integration that might be considered for the Metro Toronto region.

It should be stressed from the outset that this study is dealing only with fare integration. Fare integration is one part of the larger issue of overall integration of public transit services operating in this Region. Service rationalization and subsidy policies are issues which are directly linked to fare integration and, based on the experience of other jurisdictions, require consideration at the same time as fare integration.

TRAVEL DEMAND POTENTIAL

Based on projections of population and economic activity undertaken by several agencies in the Region, a significant growth in travel across the Metropolitan Toronto boundary can be anticipated over the next 20 years. Of importance in the interpretation of these projections is the finding that Metropolitan Toronto is expected to become much more interdependent with the adjacent municipalities than in the past.

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Over the last two decades there has been significant population growth in the adjacent municipalities, resulting in a substantial growth in commuter travel to jobs in Metropolitan Toronto. Over the next 20 years it is projected that employment will grow much more rapidly in the adjacent municipalities than in Metropolitan Toronto, resulting in a very substantial growth in travel by Metro Toronto residents to jobs in the surrounding municipalities. From a public transit point of view this will mean that increased consideration will have to be given to integrating the public transit services for travel in both directions across the Metro Toronto boundary, whereas most of the emphasis to date has been placed on commuter connections inbound to Metro Toronto.

RIDERSHIP RESULTS OF FARE CHANGES

One of the objectives of this phase of the study was to develop a methodology for assessing the impact on transit ridership of fare changes that might be incorporated into a fare integration scheme. We have reviewed the literature on the elasticity of demand with respect to fares, where elasticity is defined as a ratio of the percentage change in transit demand to the percentage change in fares. This measure provides an indication of the change in demand which can be anticipated as a result of the fare increase or decrease (in real, uninflated terms). For example, an elasticity of -.10 means that transit demand is negatively correlated to fares (a fare increase will result in a reduction in demand) and that for every 10% increase in fares the demand will be reduced by 1%.

The literature describes a wide range of studies on the elasticity of transit demand to fare changes. Very little information on fare elasticities is available for the Metro Toronto Region. The TTC have undertaken some studies on the subject, but most of the well documented studies come from the United Stated and the United Kingdom. This literature has indicated that the elasticity of demand for bus services is higher than for rail rapid transit. Typically, in large urban regions, bus system elasticities range between -.24 and -.45 and rail rapid transit system elasticities range between -.12 and -.22. Individual elasticities for particular trip purposes, trip types, and time of day can vary considerably from these system averages and it is very difficult to transpose the results of fares experience in one Metropolitan area to those in another.

We examined the fare/demand sensitivity of the logit modal split model which is currently used by several agencies in the Region for transportation planning. This model estimates the share of total trips that will use public transit as a function of the relative time and cost by public transit compared with the time and cost by private automobile. We found that the results of this model provided fare elasticities which fall within the range of the experience in other jurisdictions and therefore we concluded that this method of estimating modal split would be appropriate for estimates of the demand impact of fare changes that might be considered in later stages of this study. It should be emphasized, however, that a considerable amount of care must be exercised in interpreting the results of this approach, particularly for trips where commuter rail services are a competing mode, due to peculiarities in the way the model was calibrated.

FARE COLLECTION EQUIPMENT

At the present time, and considering the fare collection demonstrations which are now underway or planned for the near future, a variety of fare media are employed in the Region:

- cash;
- one part paper tickets (flat fare systems);
- two part paper tickets (GO rail and GO bus systems);

- magnetic single-ride paper tickets (TTC demonstration);
- multi-ride ticket books (both one part and two part tickets);
- multi-ride ticket strips (proposed for demonstration on GO rail service in 1985);
- simple but unique monthly passes (various transit carriers);
- monthly passes with photo ID (TTC & Mississauga);
- monthly pass with magnetic stripe (TTC).

While at first there may appear to be a considerable amount of incompatability between the fare media in common use in the Region, experience in other jurisdictions indicates that compatability between these media can be achieved within an integrated fare system. For example magnetically encoded and visually imprinted single-ride and multi-ride tickets are in use in other jurisdictions for both accessing gated stations on rail rapid transit services and for more general use on bus systems where visual inspection of the ticket is required.

It can be anticipated that any fare integration scheme that might be implemented in the Region would involve some reduction, consolidation and rationalization of the fare media which are currently in existence, however the extent of such change would depend on the nature of the fare integration scheme.

The report provides an overview of fare collection equipment that has been employed in revenue service or has been developed but not yet employed in revenue service. This overview provides information which can be used in the development of the fare integration strategies for the Metro Toronto region. It has been classified for the purpose of this report in five categories:

- in stations;
- on board vehicles;

- in garages;
- off premises;
- at control centres.

The equipment technology to achieve a high level of fare integration in the Metro Toronto region is either available now or it will be proven in revenue service in other jurisdictions over the next several years, such that the availability of suitable equipment should not be considered an impediment to fare integration.

REVENUE AND COST SHARING POSSIBILITIES

The degree to which revenue and/or cost sharing between carriers will be required to implement fare integration depends on the degree of fare integration and the way in which it is to be operated. The fare integration systems developed in other jurisdictions have provided a number of models which are useful to consider for the Metro Toronto region. These include methods which:

- share fare revenues;
- share operating subsidies;
- share operating costs;
- do not share revenues, subsidies or costs.

In the Metro Toronto region the transit properties have widely different revenue-cost ratios and all require operating subsidies to meet operating costs. This means that sharing arrangements under fare integration could be made to include fare revenues, subsidies, costs or some combination of these.

If it is decided to proceed with fare integration in this region, it is highly probable that satisfactory arrangements for revenue and/or cost sharing could be worked out, based on the considerable body of experience that now exists from other jurisdictions.

2. DEMAND ESTIMATES

This chapter of the Future Situation Review report deals with the potential travel demand considerations which indicate the extent of the need for improved fare integration. The Volume 1 Report (Review of Existing Policies and Systems) discusses the current cross-boundary and intermodal transfer volumes between carriers. While that report described the intermodal transfer issues in the study area, the predominant issues at the present time relate to travel across the Metropolitan Toronto boundary in both directions. This chapter provides a broad overview of the demand for cross-boundary travel across the Metropolitan Toronto boundary, and it assesses methodologies for the estimation of the demand impact of fare changes that might arise as a result of fare integration. A recommendation is provided on the most appropriate method for estimating the demand impact for fare integration schemes and this method is applied to projections of some selected cross-boundary trips to illustrate the application of the method.

GROWTH IN CROSS-BOUNDARY TRIP DEMAND

The reasons for the growth in cross-boundary travel are related to the growth of the entire Region surrounding Metropolitan Toronto. As Exhibit 2.1 shows, the population of the local municipalities surrounding Metropolitan Toronto has grown by 72% in the period from 1971 to 1981. This compares to only 2% growth within Metropolitan Toronto in the same period. Markham and Brampton have doubled their populations and substantial growth has occurred in all of the other suburban municipalities. This growth in population in the municipalities surrounding Metro Toronto has resulted in substantial increases in cross-boundary work travel over the period, particularly in the inbound direction to jobs in Metro.

Exhibit 2.2 indicates the projected population and employment growth in Metro and adjacent municipalities for the period between 1980 and 2001. These projections were prepared by the Metro Toronto Planning Depart-

EXHIBIT 2.1

HISTORICAL POPULATIONS - TORONTO CMA

MUNICIPALITY	POPULATION			% Change 1971/81	% Change 1976/81
	1971	1976	1981		
Missisauga	172,042	250,035	315,056	83	26
Oakville	58,440	68,950	75,733	30	10
Newmarket	18,941	24,795	29,753	57	20
Richmond Hill	32,384	34,716	37,778	17	9
Vaughan	15,873	17,782	29,674	87	67
Markham	36,684	56,206	77,037	110	37
Pickering	25,730	27,879	37,754	47	35
Ajax	17,344	20,774	25,475	47	23
Aurora	13,614	14,249	16,267	19	14
Brampton	70,838	103,444	149,030	110	44
Total Surrounding Regions	461,890	618,830	793,597	72	28
Metro	2,089,729	2,124,291	2,137,395	2	1

Source: 1971, 1976 - 1981 Census of Canada

EXHIBIT 2.2

ESTIMATED POPULATION GROWTH - TORONTO CMA

	POPULATION			EMPLOYMENT			EMPLOYMENT/POPULATION RATIOS		
MUNICIPALITY	1980	2001	% change	1980	2001	% change	1980	2001	% change
Metro	2,092,430	2,215,130	6	1,185,660	1,410,500	19	.57	.64	12
Ajax/Pickering	59,570	108,280	82	17,850	39,800	123	.30	.37	23
South York	210,470	455,500	116	85,050	234,150	174	.40	.51	28
Peel	464,750	864,440	86	207,500	482,980	132	.45	.56	24
Halton	126,890	229,600	81	43,910	92,653	111	.35	.40	14
Total	2,954,110	3,872,950	30%	1,539,970	2,260,083	38%	.52	.58	12

SOURCE: Metro Toronto Planning Department
Forecasts for use in travel demand projections

ment. What is significant in the projections is the very substantial increases forecast for employment in the municipalities surrounding Metropolitan Toronto. While the period of the last several decades has seen growth in the suburban municipalities as dormitory communities to Metropolitan Toronto, it is expected that this relationship will evolve to one where the surrounding communities are interdependent with Metropolitan Toronto and a substantial increase in work travel from Metro Toronto to the surrounding Region can be expected. While these large forecast increases in employment in the suburban municipalities may appear to be optimistic, and clearly the economy of the region will have to be able to support a significant increase in labour force participation rates, the forecasts do reflect current treads in the decentralization of jobs away from Metro Toronto, consistent with the increase economic maturity of the suburban municipalities.

Translating these forecasts of future economic and population activity levels, Exhibit 2.3 provides a comparison of 1980 and 2001 home-to-work trips for selected trip interchanges across the Metro boundary. These forecasts were made in 1984 for use in various rapid transit planning studies. Exhibit 2.4 is a zonal reference map. These trip interchanges were selected because our analysis of existing demand across the Metro boundary indicated that for relatively short trips the current modal split is very low, partly due to a lack of service integration and partly due to the double fare penalty attributable to cross-boundary travel. As indicated in Exhibit 2.3, substantial growth in these trips both inbound (to Metro Toronto) and outbound (from Metro Toronto) can be expected over the period to 2001. On the western boundary, home-to-work travel demand is expected to grow by almost 60%, on the north boundary by 156%, and almost 120% growth is expected on the east boundary. Thus, fare and service integration will become an even more important consideration in the next 20 years, if the transit mode share of these trips is to be increased.

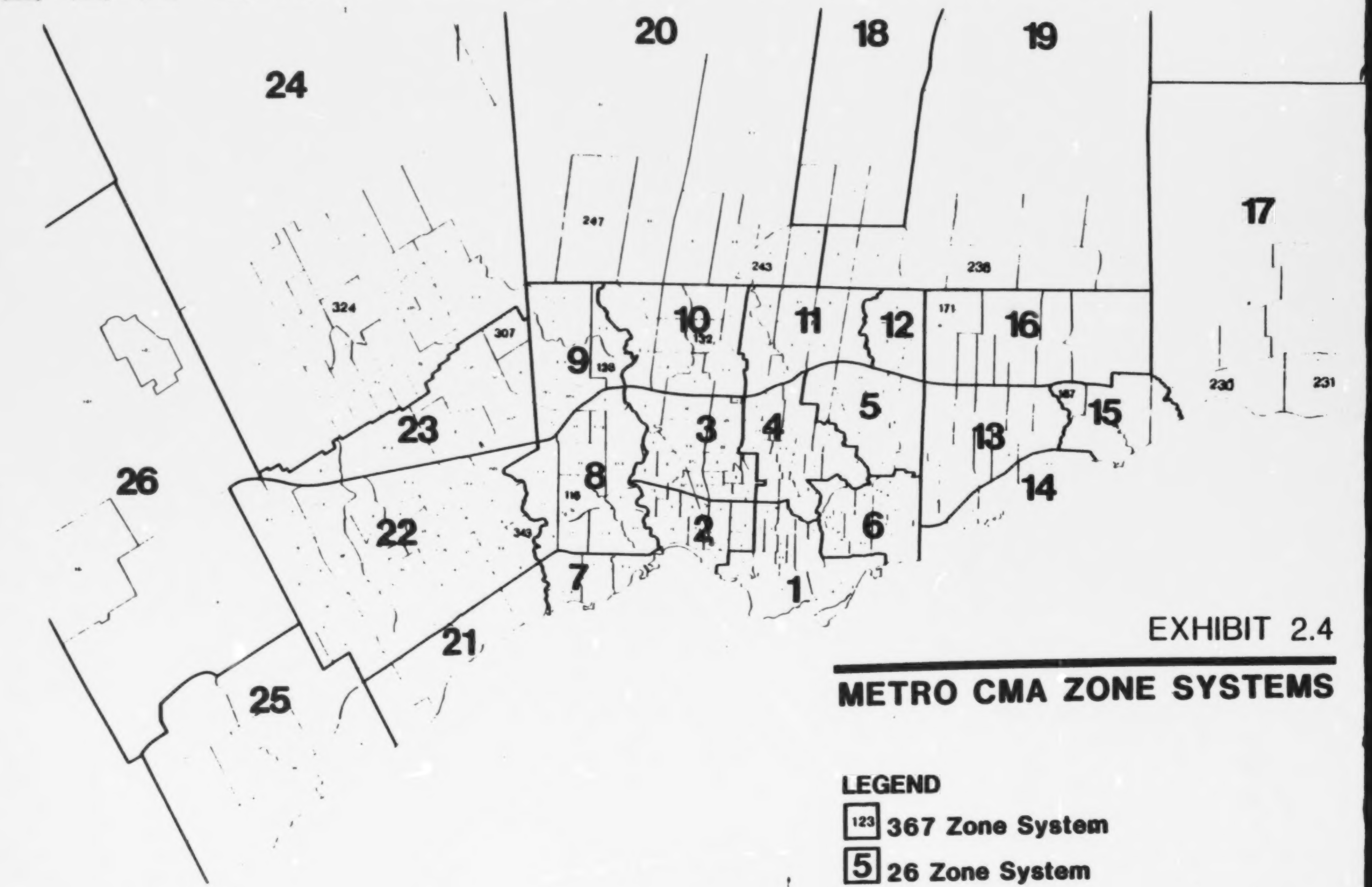
In 1980, these relatively short distance cross-boundary work trips from the adjacent municipalities to Metropolitan Toronto were equal in volume to the longer distance trips from these municipalities to Central

EXHIBIT 2.3

COMPARISON OF 24 HOUR HOME TO WORK TRIPS - 1980 AND 2001

METRO BOUNDARY	ORIGIN	DESTINATION	ORIGIN ZONE	DEST ZONE	1980			2001			% CHANGE		
					IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
WEST	MISSISSAUGA	ETOBICOKE											
	South	South	21	7	1,886	627	2,513	1,967	521	2,488	4.3	-16.9	-1.0
		Central		8	2,464	969	3,433	2,741	860	3,601	11.2	-11.2	4.9
		North		9	1,269	201	1,470	1,157	178	1,335	-8.8	-11.4	-9.2
	Central	South	22	7	3,389	1,582	4,971	5,173	2,432	7,605	52.6	53.7	53.0
		Central		8	6,140	5,431	11,571	10,339	8,280	18,619	68.4	52.5	60.9
		North		9	3,737	1,370	5,107	5,843	1,862	7,705	56.4	35.9	50.9
	North	South	23	7	132	390	522	279	1,175	1,454	111.4	201.3	178.5
		Central		8	292	2,599	2,891	653	6,533	7,186	123.6	151.4	148.6
		North		9	827	1,415	2,242	1,534	3,175	4,709	85.5	124.4	110.0
				TOTAL	20,136	14,584	34,720	29,686	25,016	54,702	47.4	71.5	57.6
NORTH	VAUGHAN/THORNHILL												
		ETOBICOKE-North	20	9	1,144	707	1,851	2,869	1,600	4,469	150.8	126.3	141.4
		DOWNSVIEW-West		10	2,967	2,294	5,261	11,529	4,599	16,128	288.6	100.5	206.6
		-East		11	513	1,727	2,240	2,609	2,873	5,482	408.6	66.4	144.7
	MARKHAM/THORNHILL	DOWNSVIEW-East	19	11	1,406	1,728	3,134	2,404	3,410	5,814	71.0	97.3	85.5
		WILLOWDALE		12	1,193	1,876	3,069	2,214	4,425	6,639	85.6	135.9	116.3
		SCARBOROUGH-North		16	1,050	2,643	3,693	3,140	7,604	10,744	199.0	187.7	190.9
				TOTAL	8,273	10,975	19,248	24,765	24,511	49,276	199.3	123.3	156.0
EAST	AJAX/PICKERING	SCARBOROUGH											
		South	17	15	628	798	1,426	1,355	1,610	2,965	115.8	101.8	107.9
		North		16	1,004	589	1,593	2,364	1,285	3,649	135.5	118.2	129.1
				TOTAL	1,632	1,387	3,019	3,719	2,895	6,614	127.9	108.7	119.1
	GRAND TOTAL CROSS-BOUNDARY TRIPS TO/FROM METRO TORONTO				30,041	26,946	56,987	58,170	52,422	110,592	93.6	94.5	94.1

Source: Metro Travel Demand Model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LEGEND
123 367 Zone System
5 26 Zone System

EXHIBIT 2.4

METRO CMA ZONE SYSTEMS

Toronto. Over the period to 2001 it is expected that these shorter distance trips will grow much more substantially than trips to Central Toronto, as a result of the continuing decentralization of employment opportunities to the suburban areas of Metropolitan Toronto and to the surrounding communities.

THE ELASTICITY OF TRAVEL DEMAND

The demand for public transportation is affected by many factors including the level of fares and the quality of service. In order to measure the relative responsiveness of transit ridership to changes in individual factors the concept of elasticity of demand is used.

Elasticity of demand is defined as the ratio of the percentage change in transit demand to the percentage change in the parameter being measured (fares, convenience, etc.).

An inelastic relationship is characterized by a ratio less than 1, i.e. the percentage effect on demand is less than the percentage change in the parameter being measured. For example if a 10% change in transit fares produced a 2% change in transit demand, there would be an inelastic relationship between demand and fares. Conversely an elastic relationship is one in which the percentage effect on demand is greater than the percentage change in the parameter being measured. Virtually all factors that affect transit use have an inelastic relationship with demand.

A negative elasticity means an inverse relationship between demand and the factor being measured, eg. an increase in transit fares causes a decrease in transit demand.

A low elasticity means that the parameter being measured has very little effect on transit demand whereas a high elasticity (close to one) means that transit demand is very sensitive to changes in the parameter. For elasticities in the range of 0 to 1, low ratios are said to be more inelastic than high (close to 1) ratios.

The literature shows that several methods have been developed for calculating the elasticity of demand each which results in a slightly different numerical value. The most common measurement of elasticity is "point elasticity", calculated by:

$$E = ((D_1 - D_0)/D_0) / ((F_1 - F_0)/F_0)$$

Where:
E - elasticity
D - demand
F - fare
0 - before change
1 - after change.

This method provides an elasticity for a particular point and has been widely used to date due to its simplicity. However, care must taken when using this method for large fare changes since a true demand curve will not be linear and therefore elasticities may vary at different fare levels.

U.S. DOT Study

One of the most comprehensive reviews of transit fare elasticities is a report by the U.S. Department of Transportation, Urban Mass Transportation Administration called Patronage Impacts of Changes in Transit Fares and Services published in September 1980. A review of other studies has shown that findings summarized in this U.S. DOT report are consistent with other evaluations of fare elasticities:

- transit demand is inelastic to fare changes; in this study transit fare elasticities were found to range from -0.04 to -0.87 with a mean of -0.28 ±.16;
- elasticities for fare increases are similar to those for fare decreases: this notion is debated in the literature. In some cases it is felt that a fare increase has a larger elasticity than a decrease but there seems to be no research to support this statement especially since there have been few fare decreases to monitor;

- fare-free elasticities are slightly smaller than comparable reduced fare elasticities: this is widely confirmed but has shown to be untrue for intra-CBD service where the result of a free fare is to divert a substantial number of walk trips to free transit service;

- small cities have larger fare elasticities than large cities: in the examples studied by this US DOT report, in cities of populations greater than 1 million, the fare elasticities range ±0.10 around -0.24 while those with less than 500,000 have fare elasticities that range ±0.12 around -0.35;

- bus travel is more elastic than commuter and rapid rail travel: several studies have confirmed that bus fare elasticities are approximately two times greater than rapid rail fare elasticities based on studies in large cities such as New York, London and Paris. There are however no confirmed statistics on the relationship between bus and commuter rail fare elasticities, but there is some evidence that commuter rail elasticities are lower than bus fare elasticities;

- off-peak fare elasticities are larger than peak fare elasticities: a number of studies show that where peak and off-peak fare elasticities have been estimated, off-peak elasticities are two to three times larger than the values observed for peak travel and these factors apply equally to bus and rail rapid transit;

- short distance trips are more elastic than long distance trips: there is general concensus in the literature that short distance travel is more sensitive to fares. One German study estimated fare elasticities of -0.32 for short trips and -0.12 for long trips;

- intra-suburban trips are more elastic than radial trips on arterials: the study cites experience in London where intra-suburban trips are shown to be more elastic than radial trips to and from the central city;

- fare elasticities rise with income and fall with age: disaggregate fare analysis in Denver and Trenton showed that there is an inverse relation between age and ridership responses during off-peak hours and that young people were more responsive to fare decreases than older persons;

- the work trip is the most inelastic of all trip purposes: it is more difficult to influence transit demand for work trips than for shopping, social recreational and school trips whose transit demand is two to three more elastic than work trips.

In terms of service elasticities, the literature is much more general than for fare elasticities. This report also provides some guidelines on elasticities of service changes, however it notes that the case studies are not large enough to support the conclusions and only generalizations are possible:

- ridership response to service changes is quite inelastic;
- off-peak ridership is more responsive to service changes than peak ridership;
- ridership is more responsive to service changes in lower service areas;
- ridership is more responsive to improvements in headways than to improvements in in-vehicle travel time.

The relationship for fare and service elasticities described in the U.S. DOT report were developed from data collected across the United States for various modes, peak/off-peak conditions, by trip distance, by route type, by trip type, by age group and by fare payment method. This data was used to develop a method for estimating fare and service elasticities for various characteristics of transit trips, modes and passengers. Appendix A of this report provides tables for adjusting aggregate, systemwide, fare elasticities based on these disaggregated characteristics. It should be stressed at this point that the estimation of elasticities of demand is fraught with a great many practical difficulties. It is often not possible to isolate a price or service change that is not accompanied by other changes which also affect demand (weather, operating cost of competing modes, etc.). Also, elasticity is often estimated for the transit system as a whole whereas a disaggregated analysis of the response to fare or service changes would show variations due to trip distance, purpose, time of day and user characteristics. A good analysis of disaggregated response is important if transit policies are to be directed to achieve maximum market penetration for specific groups of potential transit passengers. Finally, there has not been enough data collected to substantiate the validity of transfering the elasticity results from one city to another.

Having stated all of the cautionary notes which should apply to the use of the U.S. DOT results, it is still useful to consider the application of these results in the Metro Toronto region, since a similar body of data and analysis have not yet been developed for this region. The following example indicates the application of these adjustment factors to estimate a disaggregate fare elasticity:

- the objective is to estimate the fare elasticity for riders in the 45 to 65 year age category, with medium income, for shopping trips which will be made by bus on a short distance non-CBD-oriented route. Assume that the analysis is to be undertaken for a municipality of less than 500,000 and with an aggregate fare elasticity of -0.35;

- reference to Exhibit A-1 (Appendix A) provides the factors for adjusting this aggregate elasticity as follows:

  -0.35 x 0.63 (age) x 1.13 (income) x 1.16 (route)
  x 1.43 (trip length) x 1.57 (bus mode) = -0.83.

  This result means that the target group is 2.4 times as elastic as the overall system elasticity to fare changes;

- the results of this example indicate the importance of disaggregate elasticities for the assessment of fare impacts on discrete market group within the urban population.

While the use of these specific factors cannot be directly applied in the Metropolitan Toronto region, an analysis of the factors provides an important understanding of the relative elasticities of various market groups to fare changes.

Documented Results

Suburban Rail Travel - London

This discussion of the fare elasticities of suburban rail travel in London is reported in the Transport and Road Research Library - Supplementary Report No. 614, 1980. The initiation of British Rail's National Passenger Accounting and Analysis System in 1971 to collect time series data permitted a detailed analysis of elasticities of demand for suburban rail travel. The passengers analyzed were those with origins outside Greater London and with destinations at one of the main London terminals, with trip lengths less than 120 km. The data was very disaggregate with over 50 types of full fare tickets and 150 types of reduced fare tickets available. These fares were aggregated into three major groups: season tickets (period passes for weekly to annual periods), reduced fare and full fare single-ride tickets. The full fare and reduced fares fell in real (uninflated) terms between the end of 1971 and mid-1974 and did not reach the 1971 level again until mid-1975. By mid-1977 real fares were 15% higher than in 1971. In inflated terms the fares increased by a factor of approximately 2.5 from 1971 to 1977.

This analysis examined fare, service frequency and journey time elasticities. The resulting fare elasticities were approximately -1.0 for reduced fare tickets, -0.7 for full fare tickets and between -0.2 and -0.4 for season tickets. The latter group represents almost 70% of work trip passengers. The reduced fare users, which include the elderly, children and students represent trips that have more discretion than work trips and therefore the elasticity for these trips is higher than for work trips. An analysis of the effects of changes in service frequency and journey time on ridership showed that there was an extremely inelastic relationship between these measures of level of service and demand.

The types of trips studied in this report are analogous to the GO commuter rail trips from areas outside of Toronto to the Central Business District. In both cases there is a very high transit modal split into the

Central Business District for trips that are in scope for the service at both trip ends.

London Transit Fare Experience (1980-83)

During the period 1980 to 1983 London Transport, which operates both the Underground and the bus service, experienced three fare changes:

- a fare cut by one third in November 1981;
- a doubling in the Spring of 1982;
- a cut by 25% in May 1983.

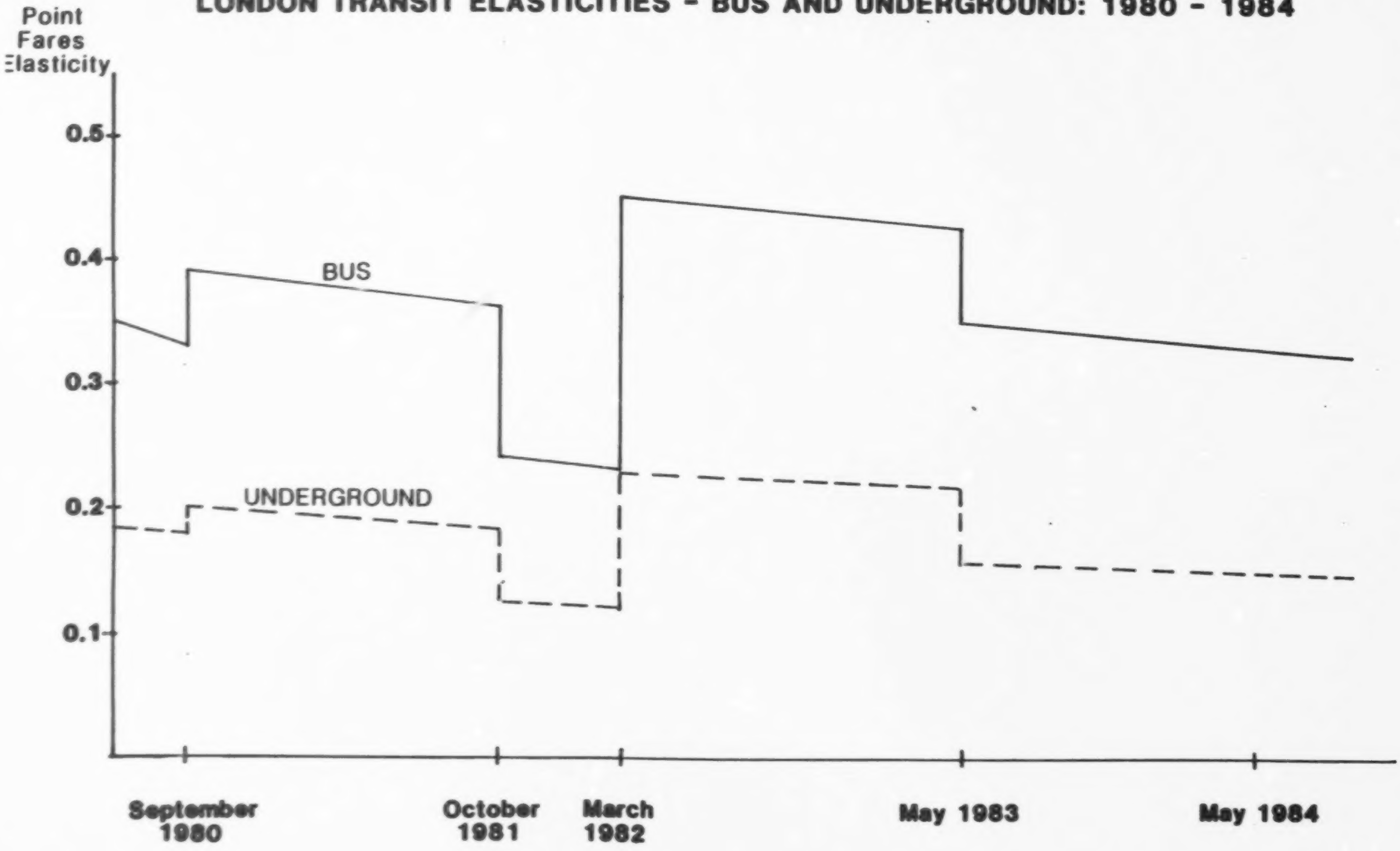
The fare change in 1983 was accompanied by the introduction of a simplified zonal fare system in the Greater London area and a system of Travelcards (period passes) to replace bus passes and underground season tickets.

The fare changes over the period from 1981 to 1983 provided substantial data for evaluating fare elasticities in London for both the bus and the Underground. Between the end of 1980 and 1983, the number of journeys made on the bus decreased by 1% and on the Underground they increased by 5 1/2%. However, the changes in fares increased the bus and Underground journeys by 8.5% and 8.9% respectively while other factors such as changes in car ownership, population, unemployment, service level and quality reduced the impact of the fare changes on the number of trips taken. Thus, if these other factors hadn't influenced passenger ridership, the changes in underground and bus use would have been much more significant.

By isolating the impacts of fare changes on demand it was possible to develop elasticities for both the bus and the Underground for the period from September 1980 to May 1984. The resulting point elasticities are shown on Exhibit 2.5. The elasticities do not include any transfers that occured between the Underground and British Rail or between the Under-

exhibit 2.5

LONDON TRANSIT ELASTICITIES - BUS AND UNDERGROUND: 1980 - 1984



Elasticities fall between revisions reflecting the gradual decline in the real fare as inflation continues ground and the bus mode. These elasticities proved successful in predicting the response to fare revisions from the mid 1970's to end of the decade. For the bus, the point elasticities ranged between -.24 and -.45, with an average of -.35. For the Underground, the point elasticities were lower ranging, between -.12 and -.22 with an average of -.17. These elasticities agree with the findings in the U.S. DOT study that passenger demand by bus travel tends to be much more elastic than for rail transit.

The transportation system in the Greater London area has many similarities to that found in the Metropolitan Toronto Region. Both areas are served by subway and bus systems, and by a commuter rail service which links the CBD to outlying areas. As mentioned earlier, there is a very high transit modal split for trips to the central area in both Toronto and London (approximately 75% and 82%, respectively). Therefore, the fare elasticities found in this examination of the fare changes in the Greater London area may be suitable as a guide for the estimation of fare elasticities in the Metro Toronto Region.

Sydney, Australia

In May, 1976, fares on the metropolitan rail services controlled by the New South Wales State Government were decreased by an average of 20%. One month after the new fare structure was introduced a sample of Sydney commuters was interviewed as a basis for directly estimating the effects of the decrease. Sydney typifies most large cities in that the train system is radial and is the primary commuter mode for long distance trips to the central area. Considering the system as a whole, patronage over the 1976/77 period had a system price elasticity of -0.19 after allowing for the cost of living increase in Sydney during the year. In order to get a more detailed look at the public's response to the fare change, personal interviews were carried out in the work place.

The survey revealed that although a significant number of travellers shifted to using transit due to the fare change, there was also a constant switching between modes for non-transport reasons such as change in work place and residence. These results alerted the analysts to the fact that looking at fare changes alone when estimating elasticities does not give a true picture of the dynamics of the change in patronage. A comparison of the results in Sydney to other cities demonstrated that the effect of fare policy varies between modes, trip length and trip purpose and that care should be taken when transferring elasticities from one situation to another.

Toronto

In 1979 a report was released by the Toronto Transit Commission that reviewed and evaluated possible options for changing the TTC fare policy. The report called Fare Structures was submitted to the Joint Metro/ TTC Transit Policy Committee as part of a larger Policy Study. The team examined various fare options including fare by distance, peak/off peak fare differential, honour system, reduced concession fares and passes. In order to evaluate the impact of the potential fare changes, elasticities of demand were estimated using the 1976 fare change.

The following system elasticities were estimated using the point elasticity formula:

o	System	- .164
o	Peak	- .147
o	Off-Peak	- .177
o	Weekend	- .250
o	Weekday	- .140

Recent discussions with the TTC regarding elasticities indicated that they currently use a system elasticity of -.13. This is quite low as compared to other systems. This is not that surprising however because attitudinal surveys by the TTC show that high proportion of Toronto residents (over 80%) feel that the service is reliable and convenient, and that the drivers are helpful and courteous. The system has a very good image in the eyes of the public. This positive response to service quality dampens the impact of fare increases, which have tended to be primarily inflation based.

Metro Travel Demand Model

The Metro Travel Demand Model is a regional travel demand simulation model that was developed by the staff of the Metropolitan Toronto Planning Department, Transportation Division. The model simulates a.m. peak period travel from home to work in the Toronto Census Metropolitan Area (CMA).

The model uses the traditional four step approach of estimating demand:

1. Trip Generation - zonal productions of daily home to work trips are based on the resident employed labour force and the attractions are determined by employment opportunities in each zone;
2. Trip Distribution - the relationships for home to work travel were derived using the 1971 census and a traditional "gravity model formulation" is used to distribute the trips. The result is a 24-hour home to work trips distribution;
3. Mode Split - the modal split is calculated in two steps. The first step uses a form of the "logit" model to give an initial split between transit and auto users, where the "auto" mode includes GO Rail, Park 'n Ride and Kiss 'n Ride. The second step in the modal split process breaks down the "auto" mode into its three sub-modes using relationships developed from the 1980 Employee Travel Survey;
4. Assignment - in this step the 24-hour home to work trips are factored into a.m. peak hour home to work trips and then these trips are factored to produce total a.m. peak hour trips. The trips are assigned initially on the basis of the shortest time path and

then adjusted according to the speed volume relationship.

The fares are assumed to be a 50¢ (in $1980) flat fare in each local municipality and where trips cross regional boundaries the fare is doubled. Thus two fares are paid for short trips which are made just across the boundary into another municipality. The travel times and headways of the transit network are based on current peak period operating schedules, with modifications for areas with new or expanded service.

One of the major weaknesses of the model is that in the primary modal split step only transit and auto (which includes GO and auto/subway mixed mode) are actually calibrated from the data. Although the trips in the "auto" mode are proportioned using district to district relationships, the modal split procedure is not entirely satisfactory. For example, a general fare decrease would cause the percent transit to increase and the percent "auto" mode to decrease; therefore the commuter and mixed mode trips would also decrease since they are estimated as a fixed proportion of the auto mode. This is contrary to the expected modal change.

In order to evaluate the sensitivity of the model to fare changes, input data for the logit modal split formula was acquired from the Metro Planning Transportation Division for various origin/destination pairs representing cross-boundary trips on the Metro Toronto border. The formulation of the logit modal split model is as follows:

$$\text{Probability (Transit)*} = \frac{e^{ut}}{e^{ua} + e^{ut}}$$

where: ut = transit utility = 0.0392 x transit in-vehicle time +
0.1049 x transit out of vehicle time +
0.0329 x transit cost-time equivalent

ua = auto utility = 0.0392 auto in-vehicle time +
0.1049 x auto auto-out-of-vehicle time +
0.0329 x auto cost time equivalent +
0.2931 [Bias]

* Probability (transit) = transit modal share.

The cost time equivalent parameter measures the cost of the trip in units of time. The cost of the auto trip includes an average cost in cents per kilometer traveled plus half of the parking costs in cents, while the transit cost is the applicable transit fare. In order to equate the cost of the trip to the time it represents for the passenger, these costs are then divided by the household income per minute of working.

The 24 hour home-to-work trips are factored into a.m. peak hour total trips in two steps. The first step converts the 24 hour home-to-work trips into a.m. peak hour home-to-work trips using factors based on the location of the place of work and by mode. These trips are then factored into the a.m. peak hour total trips by factoring in the non-work trips based on mode and trip distance.

Exhibit 2.6 shows the resulting transit modal split and the elasticity of demand with respect to fares for selected a.m. peak hour cross-boundary trips. For a reference map showing location of the zones see Exhibit 2.4.

Final point elasticities for the cross-boundary trips and for a 10% fare change, from $1.00 to 90¢, range between -.22 and -.34. These elasticities were calculated using the formula on p.10. For the Brampton to Etobicoke trip, a fare change of 10% (from $1.00 to 90¢) produced an

XHIB 2.6

METRO TRAVEL DEMAND MODEL - SENSITIVITY TO FARE LEVEL
(Year 2001 Forecasts for Cross-Boundary Trips)

ORIGIN (zone)	DESTINATION (zone)	DISTANCE (km)	ANNUAL INCOME	AUTOMOBILE				TRANSIT				TRANSIT SHARE (%)	ELASTICITY
				Total (min)	In Veh (min)	Out Veh (min)	Park (cents)	Total (min)	In Veh (min)	Out Veh (min)	Fare (cents)		
BRAMPTON (324)	ETOBICOKE (123)	22.3	$29,207	34.8	32.8	2	0	67	44	23	100	16.3	
				34.8	32.8	2	0	67	44	23	90	16.9	-0.34
				34.8	32.8	2	0	67	44	23	80	17.5	-0.31
				34.8	32.8	2	0	67	44	23	70	18.1	-0.27
HALTON (307)	ETOBICOKE (123)	9.6	$29,856	18.2	16.2	2	0	36	15	21	100	20.4	
				18.2	16.2	2	0	36	15	21	90	21.0	-0.32
				18.2	16.2	2	0	36	15	21	80	21.7	-0.29
				18.2	16.2	2	0	36	15	21	70	22.4	-0.25
MISSISSAUGA (343)	ETOBICOKE (116)	6.3	$26,206	14.2	12.2	2	0	23	8	15	100	38.5	
				14.2	12.2	2	0	23	8	15	90	39.6	-0.28
				14.2	12.2	2	0	23	8	15	80	40.7	-0.25
				14.2	12.2	2	0	23	8	15	70	41.8	-0.22
VAUGHAN (247)	DOWNSVIEW (132)	14.7	$39,184	21.5	19.5	2	0	42	26	16	100	26.8	
				21.5	19.5	2	0	42	26	16	90	27.4	-0.22
				21.5	19.5	2	0	42	26	16	80	28.0	-0.20
				21.5	19.5	2	0	42	26	16	70	28.6	-0.18
THORNHILL (243)	DOWNSVIEW (132)	8.4	$35,030	13.8	11.8	2	0	30	15	15	100	28.9	
				13.8	11.8	2	0	30	15	15	90	29.6	-0.24
				13.8	11.8	2	0	30	15	15	80	30.3	-0.22
				13.8	11.8	2	0	30	15	15	70	31.0	-0.19
PICKERING (230)	SCARBOROUGH (167)	13.0	$32,379	16.9	14.9	2	0	43	25	18	100	15.6	
				16.9	14.9	2	0	43	25	18	90	16.1	-0.31
				16.9	14.9	2	0	43	25	18	80	16.6	-0.28
				16.9	14.9	2	0	43	25	18	70	17.1	-0.25
AJAX (231)	SCARBOROUGH (167)	19.8	$30,218	23.4	21.4	2	0	57	37	20	100	13.3	
				23.4	21.4	2	0	57	37	20	90	13.8	-0.34
				23.4	21.4	2	0	57	37	20	80	14.3	-0.31
				23.4	21.4	2	0	57	37	20	70	14.7	-0.27
MARKHAM (238)	SCARBOROUGH (171)	6.3	$35,204	12.5	10.5	2	0	30	14	16	100	25.0	
				12.5	10.5	2	0	30	14	16	90	25.7	-0.25
				12.5	10.5	2	0	30	14	16	80	26.3	-0.23
				12.5	10.5	2	0	30	14	16	70	27.0	-0.20

Note: See Exhibit 2.4 for Location of Zones elasticity of: $\frac{16.33 - 16.90}{16.33} \div \frac{100 - 90}{100}$

$$= \frac{-.0344}{.10} = -.344$$

These elasticities reflect relatively short bus trips across the boundary and result from the primary modal split using the logit model formulation developed by the Metro Toronto Planning Transportation Division. The elasticities derived through this model are comparable to those found in the literature for bus transit. For example, the London bus transit elasticities were found to range between -.24 and -.45. In the U.S. DOT report, where elasticities were gathered from all over the United States, the fare elasticities for the bus mode were reported in the range of -.44 and ±.14.

The system elasticities reported by the TTC, as well as their disaggregate elasticities by time of day, are lower than the findings from the example application of the Metro logit model for short cross-boundary trips. This is because the TTC characteristics are strongly influenced by the substantial proportion of passengers who use rail rapid transit and the literature indicates elasticities applicable to rail rapid transit are substantially lower than for bus transit. Further, the absolute level of the fare for travel within Metropolitan Toronto is one-half the fare applicable to the cross-boundary trips used in this analysis.

In summary, after reviewing the literature on fare elasticities and comparing these with the results of the Metro demand model elasticities, we have concluded that the use of the Metro travel demand model provides a reasonable basis for evaluating the impacts of fare changes that might result from fare integration schemes in the Metro Toronto Region. As indicated throughout the literature, interpretation of the results of these elasticity estimates should be treated with care, particularly where commuter rail is a major transit mode. In these situations manually-derived elasticities based on the experience in other jurisdictions might be more appropriate than use of the model.

FUTURE DEMAND POTENTIAL

The initial section of this chapter presented a review of the characteristics of existing and projected future travel demand across the Metro Toronto boundary and demonstrated that major increases in travel demand across the boundary can be expected over the next 20 years. The next section discussed the results of our analysis of the elasticity of demand with respect to fare changes and recommended that the Metro Toronto planning model using the logit modal split formulation be used to estimate the impact of fare changes on transit demand.

This section of the report describes the sensitivity of transit demand estimates for selected origin/destination pairs to changes in transit fares. It should be noted that the following elasticity results will probably provide a conservative estimate of potential transit demand increases, since improvements in the integration of transit services across the Metro boundary which would logically go along with fare integration have not been explicitly included in the analysis.

Exhibit 2.7 shows the potential increases in modal split which would apply if there was a fare reduction for relatively short cross-boundary trips. Exhibit 2.4 provides a map of the Region showing the location of the zones in question. The fare integration scenario which this analysis represents would involve a reduction in fare for short distance cross-boundary trips, to a level which would be somewhat above or equal to the individual fare (50¢) in each of the two municipalities.

Exhibit 2.7 shows the initial estimates of modal split, assuming a $1.00 transit fare and the "base case" transportation network for 2001. This base case assumes no further additions to the rapid transit system in the study area other than the completion of the Scarborough Rapid Transit line from Kennedy and Eglinton to McCowan Road. Logical extensions of the surface transit network were included, but as mentioned earlier, cross-boundary transit service integration was not explicitly assumed.

EXHIBIT 2.7

COMPARISON OF TRANSIT USAGE AT VARYING FARE LEVELS

ORIGIN (zone)	DESTINATION (zone)	DISTANCE (km)	FARE (cents)	AM PEAK ALL TRIPS	
				TRANSIT USEAGE (%)	TRANSIT INCREASE* (%)
BRAMPTON (324)	ETOBICOKE (123)	22.3	100	16.3	
			75	17.8	8.8
			50	19.3	18.1
MALTON (307)	ETOBICOKE (123)	9.6	100	20.4	
			75	22.0	8.1
			50	23.8	16.7
MISSISSAUGA (343)	ETOBICOKE (116)	6.3	100	38.5	
			75	41.3	7.0
			50	44.0	14.2
VAUGHAN (247)	DOWNSVIEW (132)	14.7	100	26.8	
			75	28.3	5.6
			50	29.8	11.4
THORNHILL (243)	DOWNSVIEW (132)	8.4	100	28.9	
			75	30.7	6.1
			50	32.5	12.4
PICKERING (230)	SCARBOROUGH (167)	13.0	100	15.6	
			75	16.8	8.0
			50	18.2	16.4
AJAX (231)	SCARBOROUGH (167)	19.8	100	13.3	
			75	14.5	8.8
			50	15.8	18.2
MARKHAM (238)	SCARBOROUGH (171)	6.3	100	25.0	
			75	26.6	6.4
			50	28.3	13.1

* Change in Proportion Using Transit from the $1.00 Fare.

With a reduction in fare to a level of 50¢ ($1980), the increase in modal split which could be anticipated for these interchanges ranged from 11%-18%, with the resulting modal splits ranging from 16% (Ajax to Scarborough) to 44% (Mississauga to Etobicoke).

This analysis was undertaken to illustrate the potential sensitivity of modal split to changes in fares. It is not meant to illustrate a desirable fare scenario nor can we comment further on the results at this stage of the study.

3. FARE COLLECTION EQUIPMENT REVIEW

The functions of a public transit fare collection system can include some or all of the following:

- vending of fare media;
- passenger entry and exit control;
- cancellation of multi-ride ticket media [involving the subtraction of one ride (or the value of one ride) from a multi-ride or stored value ticket];
- verification of a correctly tendered fare and rejection of an incorrect amount or unacceptable fare media;
- revenue transfer and financial audit;
- passenger statistics;
- data communications and processing.

Rail Fare Collection Options

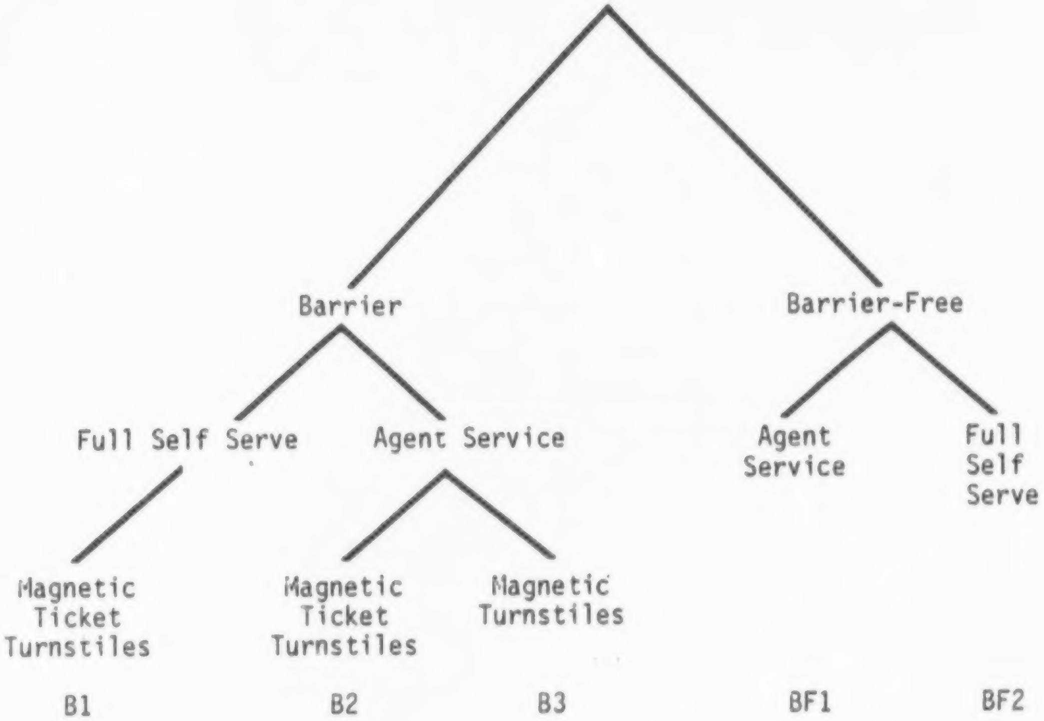
Rail transit fare collection systems can be described generically in two major categories:

- systems which control passenger entry and exit by turnstiles which perform the function of verifying that the correct fare payment has been made, on entry, exit or on entry/exit;
- systems which rely on roving inspectors who check passengers at random within the fare paid area of stations and on-board the vehicles. These systems do not have a fare control barrier in the station and are often referred to as proof of payment systems.

Exhibit 3.1 graphically depicts the generic rail fare collection alternatives. System B1 employs magnetic ticket technology to operate the turnstiles. The majority of these systems have been designed for complete self-service operation. While an attendant may be present in the station, the function of the attendant is to supervise operations, and not to sell ticket media.

EXHIBIT 3.1

RAIL FARE COLLECTION OPTIONS


Barrier
Barrier-Free
Full Self Serve
Agent Service
Agent Service
Full Self Serve
Magnetic Ticket Turnstiles
Magnetic Ticket Turnstiles
Magnetic Turnstiles
B1
B2
B3
BF1
BF2

In some installations, a ticket agent may sell magnetically-encoded tickets as a partial or full replacement for the ticket vending machines which would be part of System B1. This system is referred to on the diagram as B2.

Most rapid transit systems in North America employ conventional mechanical turnstiles which accept tokens and/or coins to verify fare payment. These systems commonly employ a station attendant to sell fare media and to check monthly pass holders by visual inspection. This system is referred to as B3 on Exhibit 3.1.

Two barrier free options are identified, the first (BF1) would have unattended stations and would sell all or most of the fare media through ticket vending machines. High value monthly passes may be sold off premises. The second system (BF2) would employ an agent to sell some or all of the ticket media through the use of a booking office machine.

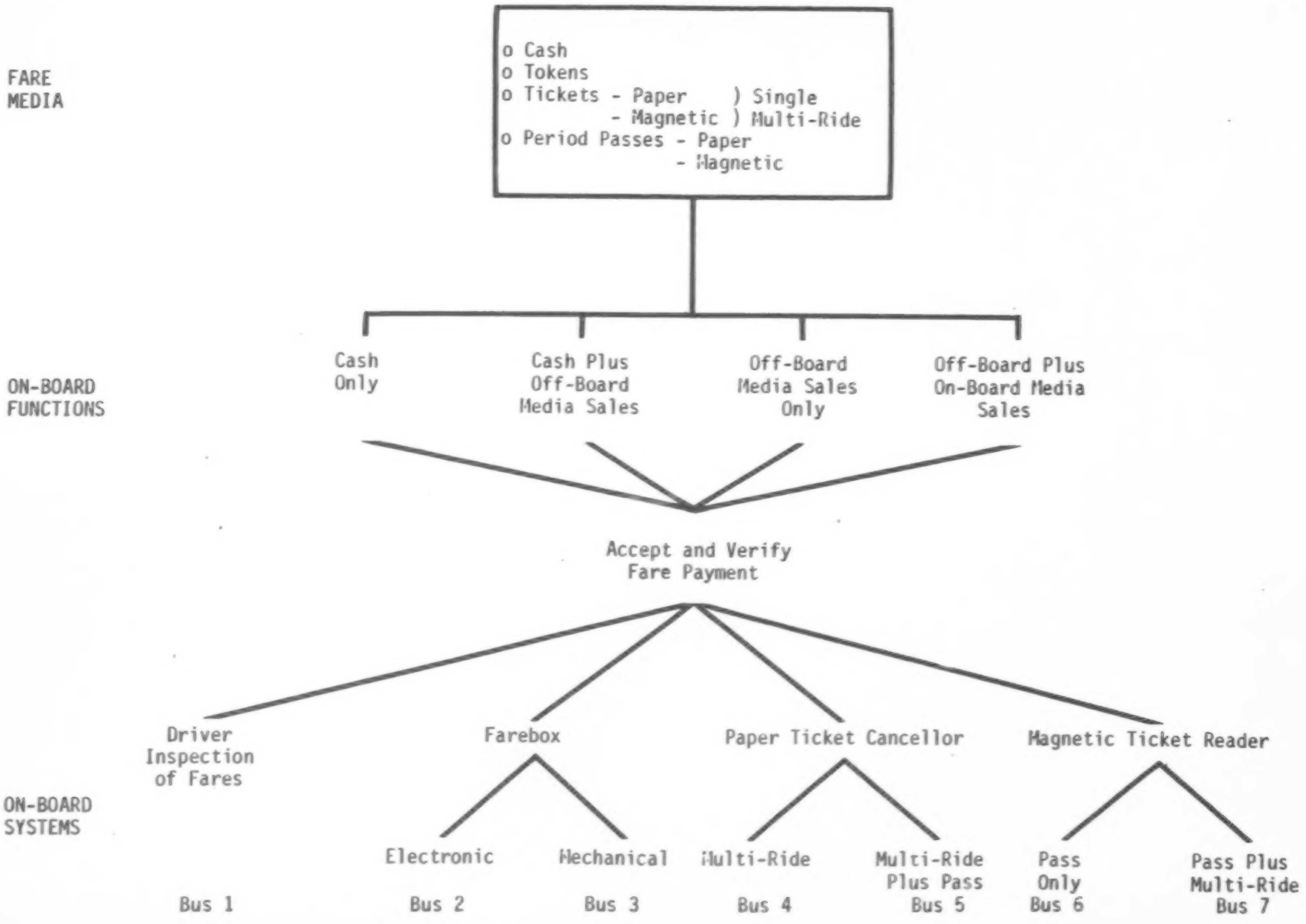
Bus Fare Collection Options

The process of selling fare media and verifying correct fare payment on-board cannot be as neatly classified as the rail fare collection options, since a number of combinations of different fare media and on-board fare verification functions are possible. Therefore, Exhibit 3.2 outlines possible options for media sales and fare verification and on-board processing. This gives rise to seven bus fare collection options, referred to as Bus 1 through Bus 7 on Exhibit 3.2.

The objective of this chapter of the report is to provide a brief overview of existing fare collection technology which provides for the functions outlined in Exhibits 3.1 and 3.2 as well as auxillary revenue and data processing functions. Since the performance specifications for much of this equipment varies widely, it is not possible to provide representative equipment costs at this stage of analysis.

EXHIBIT 3.2

BUS FARE COLLECTION OPTIONS


FARE MEDIA
o Cash
o Tokens
o Tickets - Paper) Single
- Magnetic) Multi-Ride
o Period Passes - Paper
- Magnetic
ON-BOARD FUNCTIONS
Cash Only
Cash Plus Off-Board Media Sales
Off-Board Media Sales Only
Off-Board Plus On-Board Media Sales
Accept and Verify Fare Payment
ON-BOARD SYSTEMS
Driver Inspection of Fares
Farebox
Paper Ticket Cancellor
Magnetic Ticket Reader
Electronic
Mechanical
Multi-Ride
Multi-Ride Plus Pass
Pass Only
Pass Plus Multi-Ride
Bus 1
Bus 2
Bus 3
Bus 4
Bus 5
Bus 6
Bus 7

SOME EQUIPMENT RELATED FARE COLLECTION ISSUES IN THE METRO TORONTO REGION

Within the Metropolitan Toronto Region the 17 carriers use basically the same four fare categories (adult, seniors, students, and children) but there is a wide variation in their definition of these categories and in the discounts from a full adult fare which apply to concessionary fare categories. Further, there is a wide variation in the fare structure between transit operators in the Region, as represented by the types of fares offered and the discounts provided for each fare type within each category of fare. These issues have been discussed more fully in our review of existing policies and systems (Volume 1).

A fare integration scheme may not involve a rationalization of the existing fare structures, or the rationalization of fare structures may take place some time after initial fare integration plans are implemented. It is not appropriate at this stage to judge whether or not this rationalization might occur over time, however it would appear prudent to consider fare integration schemes which might not initially require a significant rationalization of the fare categories and fare structures operating within the Region. For example, initial efforts might involve only period passes for adult passengers. These fare integration arrangements might be undertaken by two cooperating transit properties such as Mississauga and the TTC, where the differences between the adult single ride and pass fares are not substantial and where a compromise arrangement could be worked out to the satisfaction of both parties. Ultimately, it is reasonable to assume that some level of difference will continue to exist between transit properties with respect to their definition of individual fare categories and their treatment of these fare categories in the fare structure. It may therefore be necessary for the fare collection system to recognize these differences and to properly account for the financial and passenger use transactions as they take place.

At the present time, and considering the fare collection demonstrations which are in effect or planned for the near future, a variety of fare media are employed in the Metro Toronto region:

- cash;
- one part paper tickets (flat fare and GO bus systems);
- two part paper tickets (GO rail system);
- magnetic single ride paper tickets (TTC demonstration);
- multi-ride ticket books (both one part and two part tickets);
- multi-ride ticket strips (proposed for demonstration on GO rail service in 1985);
- simple but unique monthly passes (various transit carriers);
- monthly period passes with photo ID (TTC & Mississauga);
- monthly period pass with magnetic stripe and photo ID (TTC demonstration).

While at first there may appear to be a considerable amount of incompatibility between the fare media in common use in the Region, experience in other jurisdictions indicates that compatibility between these media can be achieved. For example, magnetically encoded and visually imprinted tickets are used in Tyne & Wear to access gated stations on the Metro and for more general use on the bus system. The monthly pass and tickets used in the TTC magnetic ticket demonstration are acceptable for use on the rest of the system where visual inspection methods are employed. The Netherlands is planning to introduce a stored value magnetic ticket which is also visually imprinted to facilitate both machine and visual inspection of the ticket.

85-6704 Transit fare integration in the Toronto area : phase II

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EQUIPMENT REVIEW

The state of fare collection technology at the present time is not capable of adapting to all combinations of the above media on all systems in the Region, however developments are occuring which should make this a realistic possibility within the next five years. The following is a brief qualitative summary of fare collection equipment which might be considered as part of a fare integration scheme in the Region. The purpose of this review is to provide a broad understanding of the capability of the equipment, including relative strengths and weaknesses and, where it is not proven in revenue service, an estimate of the development status of the equipment. No attempt here has been made to speculate on fare collection equipment which is currently under development.

The available fare collection equipment has been grouped by location and function for ease of presentation. Exhibit 3.3 summarizes the equipment types, including their current status. The applicability of this equipment to the rail and bus fare collection options (outlined in Exhibits 3.1 and 3.2) is also indicated. The equipment within each of the five location categories is discussed further in the following text, including the application and results and the strengths and weaknesses of the equipment.

The following terms are defined here to assist in reading the technical portions of the equipment descriptions:

- MCBF - means cycles between failure is a common measure of reliability. A cycle is a single use of the machine which may involve a single function such as cancelling a ticket, to multiple functions such as keying in ticket information, computation of fare and issuance of a correctly imprinted ticket. Acceptable MCBF rates vary according to the type and complexity of the equipment.

- Magnetic encoding - refers to the process of storing information in a magnetic strip on the back of a paper ticket. This information can include value of the fare, origin station, destination station, validity

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SUMMARY OF FARE COLLECTION EQUIPMENT

FUNCTION	EQUIPMENT TYPE	STATUS	APPLICATION
Station Equipment			
o Agent vending of fare media	Booking office machines (BOM's)	Proven in revenue service	B2, BF1
o Self service vending of fare media	Magnetically encoded ticket vending machines (TVM's)	Proven in revenue service	B1
	Excess fare machines (Addfare)	Proven in revenue service	B1
	Visually imprinted TVM's	Proven in revenue service	BF2
	Token and change vending machines	Proven in revenue service	B3
o Multi Ride ticket cancellation	Electro-mechanical and electronic cancellors	Proven in revenue service	BF1, BF2
	Magnetic cancellors	Developed but not proven	BF2
o Passenger entry and exit control	Magnetic gates (turnstiles)	Proven in revenue service	B1, B2
	Coin and token gates	Proven in revenue service	B3
On Board Vehicle Equipment			
o Operator vending of fare media	Electro-mechanical ticket issuers	Proven in revenue service	Bus 1
	Electronic ticket issuers	Proven in revenue service	Bus 1
	Magnetic transfer issuers	Developed but not proven	Bus 6, Bus 7
o Fare acceptance and verification	Non-registering fareboxes	Proven in revenue service	Bus 2
	Registering fareboxes	Proven in revenue service	Bus 1
o Multi Ride ticket cancellation	Electro-mechanical and electronic cancellors	Proven in revenue service	Bus 6, Bus 7
	Magnetic cancellors	Developed but not proven	Bus 4, Bus 5

EXHIBIT 3.3 (CONT'D)

FUNCTION	EQUIPMENT TYPE	STATUS	APPLICATION
Garage Equipment			
o Revenue Collection and transfer	Cashbox receivers and bins	Proven in regular service	Bus 2
	Audit units	Proven in regular service	Bus 2
o Data collection equipment	Electronic probes	Proven in regular service	Bus 2
	Data processing computers	Proven in regular service	Bus 2
Off-Premises Equipment			
o Agent vending of fare media	Booking office machines (BOM's)	Proven in regular service	Bus 1, Bus 4, Bus 5, Bus 6, Bus 7
o Self service vending of fare media	Ticket vending machines (TVM's)	Developed but not proven	B1, BF2
	Automatic Teller Machines (ATM's)	Developed but not proven	B1, BF2
	Credit card operated TVM's	Developed but not proven	B1, BF2
Control Centre Equipment			
o Data collection	Data acquisition devices	Proven in revenue service	Bus 2, Bus 4, Bus 5, Bus 6, Bus 7
o Data Communications	Computer communications systems	Proven in revenue service	B1,B2,BF1,BF2
o Data processing and control	Monitor and control computers	Proven in revenue service	applicable to most systems

dates, etc. to control passenger use. These tickets are normally used to open gates (turnstiles) in rapid transit stations.

- Visual imprinting - refers to the process of printing paper tickets, either in a self-service ticket vending machine (TVM) or through an agent operated booking office machine (BOM). This process adds value to blank paper stock and produces proof of the fare paid.

- Gates - control the entry and exit of passengers through rapid transit stations. They are also referred to as turnstiles. They may be opened by the insertion of correctly encoded magnetic tickets or tokens or the correct fare value in coins.

- Ticket transport - is a mechanism which takes the passenger's ticket, reads and verifies the information on the ticket and then returns the ticket to the passenger. These devices are normally part of a magnetic gate, with the ticket, when verified, being used to open the gate.

- Swipe reader - is a device to read information encoded on the magnetic strip of a ticket, pass or credit card. It has no moving parts and the passenger performs the function by dragging or "swiping" the card through a slot.

- Barrier-free system - refers to the "honour" or "proof of payment" fare collection system. There are no gates or other barriers in stations and passengers must show evidence of proof of fare payment (ticket, pass, transfer, etc.) to an inspector, usually on-board the transit vehicle.

- Multi-ride ticket cancellor - is a device, similar to a time clock in operation, which "cancels" one ride from a multi ride strip ticket by imprinting the date, time and station (stop) of the boarding passenger. If the ticketing system employs magnetic encoding, the magnetic cancellor will re-write the remaining value or number of rides on the ticket as part of the cancelling operation.

STATION EQUIPMENT

Agent Vending of Fare Media - Booking Machines (BOMs)

These machines are equiped with a keyboard and, following the keying in of the correct information by the ticket agent, will issue a visually-imprinted or visually-imprinted and magnetically encoded ticket. The magnetic encoding is contained in a magnetic strip on the back of the ticket. The equipment can range from simple, electro-mechanical equipment typical of that in use over the last three decades, to more sophisticated current-generation electronic equipment. They keep a record of every sales transaction.

Application and Results

They can be applied in barrier and no barrier rail and bus systems. Reliability is in the 6,000 to 60,000 MCBF range. They are employed in such systems as MTA-Baltimore, Metro North Commuter Rail in New York and soon to be operating in NJ Transit rail stations in New Jersey. They will be tested by GO Transit in stations on the Milton Rail line in 1985.

Strengths and Weaknesses

They provide great flexibility and strict accountability for all tickets issued. Record data can be stored in cassettes or solid state modules or transmitted to a remote point. When issuing magnetic tickets, they can be used to upgrade the tickets as well as to analyze the encoding on the tickets. Fare tables can be down loaded into the BOMs or loaded through a cassette or solid state module.

Self-Service Vending of Fare Media - Magnetically-Encoded Ticket Vending Machines (TVMs)

These TVMs can vend magnetically-encoded tickets of different fare categories, such as adult, senior citizen, student, child or a combination. The tickets may be of different types, such as single trip, round trip, weekly, multi-trip, stored value or a combination. Due to the limitation of note denominations that can be accepted (TVMs proven in revenue service do not accept note denominations greater than $5) high value fare media, such as monthly passes, are not currently vended from TVMs. The tickets of each category and type may vary by destination distance or length of trip (zone), class (1st or 2nd) and time of day and day of week of travel (peak or off-peak).

The TVMs may accept bills only, coins only or a combination, encode and print tickets on issue or issue pre-encoded and pre-printed tickets, and may require exact fare or give change. Inserted notes may or may not be returned in the event of cancellation of a transaction. If not, coins or fare media may be issued in kind. They may accept and capture tickets with value remaining as credit toward the purchase of a new ticket.

Application and Results

This equipment augments certain functions of station agents and provides ticket issuing service at unattended station entrances in barrier controlled rail systems. The equipment reliability is in the 1,000 to 10,000 Mean Cycles Between Failure (MCBF) range. A cycle is a single transaction, but may involve several steps.

These TVMs are employed in most magnetic ticket systems, such as:

- Illinois Control Gulf Rail Road (ICGRR), Chicago, since 1966;
- Port Authority Transit Corporation (PATCO), Lindenwold, NJ, since 1968;
- Bay Area Rapid Transit District (BART), San Francisco, since 1972;
- Washington Metropolitan Area Transit Authority (WMATA), Washington, DC, since 1976.

- Mass Transportation Administration (MTA), Baltimore, since 1983.

This could have application to TTC if the Magnetically Encoded Ticket (MET) system, presently undergoing test, is implemented.

Strengths and Weaknesses

High capital, operating and maintenance costs apply to this equipment. It is very flexible in the number of different tickets that can be vended, with up to 100 or more different categories, types, destinations, class and travel time available, if needed. The equipment maintains a detailed record in a cassette or solid state module, and this record is transmitted to a remote computer when interrogated by the computer over a communications line. The functions of the machine can also be remotely monitored, so that if it fails a maintenance technician can be quickly dispatched.

Self-Service Vending of Fare Media - Excess Fare (Addfare)Machines

These Addfare machines are only employed in systems which have fares that vary by distance travelled on time of day. It involves a stored value system using magnetically-encoded tickets in which the fare media has a certain value, and an amount is automatically deducted from the media at the end of each trip. As the amount deducted will vary with trip length (usually), there may be situations that arise where there is insufficient value remaining on the ticket to permit exiting at the destination station. Thus, the ticket must be increased in value and the Addfare machine will indicate the remaining amount due to exit the station when the stored value ticket is inserted. The passenger must then deposit the amount indicated into the machine. They may accept coins only or coins and bills and they may or not give change.

Application and Results

They are employed in stored value rail systems to enable passengers whose tickets have insufficient value to exit to be upgraded so they will operate the exit gates. Reliability is in the 1,500 to 15,000 MCBF range. They are presently in use in San Francisco (Bay Area Rapid Transit) and Washington (Washington Metro). They are usually employed in zone or point-to-point fare structures but also may be used in flat fare structures where the flat fare may vary by time of day and day of week.

Strengths and Weaknesses

High capital, operating and maintenance costs apply to this equipment. It is very flexible in handling different types of tickets (adult, elderly, handicapped, child, etc.). It maintains detailed record of transactions.It can be remotely monitored and controlled.

Self-Service Vending of Fare Media - Visually-Imprinted Ticket Vending Machines (TVMs)

This equipment is the same in function as the magnetic ticket TVMs outlined above except the tickets are not magnetically encoded. The tickets are usually printed from a roll or fan-folded ticket stock. Tickets with value remaining cannot be accepted for credit.

Application and Results

This equipment augments certain functions of station agents and provides ticket issuing service at unattended station entrances or off-premises locations in no barrier rail systems. Its reliability is in the 2,000 to 20,000 MCBF range. The same conditions regarding reliability apply for this equipment as for the magnetic ticket TVMs. It is employed in most no barrier fare collection systems such as:

- Edmonton Transit, since 1979;
- Calgary Transit, since 1981;
- San Diego Metropolitan Transit Development Board (San Diego Trolley), since 1981.

It is used in operator monitored bus systems, such as:

- o Tri-County Metropolitan Transportation District of Oregon (Tri-Met), Portland, since 1983;
- o Sacramento Regional Transit District (SRTD), since 1984;
- o New Jersey Transit (NJT), Newark, since 1984.

It is employed in operator monitored rail systems, such as:

- o San Francisco Municipal Railway (MUNI), since 1983
- o Municipality of Metropolitan Seattle (Seattle Metro Waterfront Street Car), since 1983;
- o NJT, since 1983;
- o Long Island Rail Road (LIRR), Jamaica, New York, since 1984;
- o Southeastern Pennsylvania Transportation Authority (SEPTA), Philadelphia, since 1984.

It could have application to GO Transit if the Proof of Payment fare collection system demonstration is implemented system-wide.

Strengths and Weaknesses

The capital and maintenance costs for this equipment are less than for magnetic ticket TVMs. As far as operating costs are concerned the tickets cost less than magnetically encoded tickets, but the costs of servicing the equipment are similar to magnetic ticket TVMs for equal use. The printed fare media TVMs have the same flexibility, record keeping and remote monitoring and control capability as the magnetic ticket TVMs. These TVMs usually produce a printed output of all monetary, statistical, maintenance and security records, as well as storing data in a cassette or solid state module and may transmit the data to a remote point when interrogated.

Self-Service Vending Fare Media - Token and Change Vending Machines

This equipment is the same as magnetic ticket TVMs, except that tokens and/or change are dispensed.

Applications and Results

This equipment augments certain functions of station agents and provides token dispensing service at unattended station entrances in barrier rail systems. It is usually applied in a flat fare structure, as with TTC. The reliability is in the 3,000 to 30,000 MCBF range. The conditions which affect the reliability of this equipment are similar to those discussed for paper and magnetic TVMs, except that this equipment is inherently more simple. These vending machines have been used in a number of North American transit properties, including:

- TTC, since 1956;
- New York City Transit Authority (NYCTA), New York, since 1967;
- Niagara Frontier Transportation Authority (NFTA), Buffalo, to start in 1985;
- Southeastern Michigan Transportation Authority (SEMTA), Detroit, Downtown People Mover to start in 1986.

Strengths and Weaknesses

This equipment requires less capital and maintenance costs than printed fare media TVMs. The cost of handling tokens could exceed the cost of printed tickets, but similar equipment servicing costs apply as for magnetic or printed ticket media TVMs for equal use. This is usually tempered by fewer fare levels, categories and types from which to choose. It has less flexibility than magnetic or printed fare media TVMs. Record keeping and remote monitoring and control are usually more restricted than with magnetic or printed fare media TVMs.

Multi-Ride Ticket Cancellation - Electro-Mechanical and Electronic Cancellors

Multi-ride strip tickets contain up to 12 rides on a single strip, with the process of paying for a ride involving imprinting the date, time and possibly station name and machine number on the ticket. The cancellor provides the imprinting function and in addition it may retain in solid state memory certain data on the number of cancellations.

Both electro-mechanical and electronic cancellors are in common use. The electro-mechanical cancellors merely provide the cancellation function, whereas the electronic cancellors may be capable of more sophisticated security checks on the validity of the ticket and retention of data on number of cancellations by type of multi-ride ticket.

Application and Results

This equipment is applied mostly in barrier-free rail and bus systems, but it has been used to control gates. Reliability is in the 2,000 to 20,000 MCBF range. Calgary and San Diego have employed multi-ride cancellors in their light rail systems. Electronic cancelling units will be tested by GO Transit in the Milton rail stations in 1985.

Strengths and Weaknesses

As there is little counterfeit protection, except with the new electronic units, they are usually only employed in no barrier systems with inspectors who can visually examine the tickets. They can be monitored and controlled remotely.

Multi-Ride Ticket Cancellation - Magnetic Cancellors

These units cancel a trip or deduct a value on the fare media by changing the magnetic encoding. They usually print the remaining trips or value on the fare media, except for the swipe type which cannot print on the fare media. Those which print employ a ticket transport mechanism for magnetically reading, writing and visually imprinting. All types can also be employed to check pass validity.

Application and Results

These cancellors can be used to control gates or to merely deduct trips or value in a no barrier system, which may or may not be operator monitored. Reliability in the range of 3,000 to 30,000 MCBF is expected. These units have not yet been employed on gates or in no barrier systems but a number of tests have been run. They are approximately three to five years away from extended revenue service.

Strengths and Weaknesses

They provide better counterfeit protection due to the magnetic encoding than electro-mechanical cancellors. Due to the magnetic encoding, many ticket types and values can be accommodated. Record keeping and remote monitoring and control are readily attainable.

Passenger Entry and Exit Control - Magnetic Gates

Magnetically encoded tickets or passes may be used to release or open the gates. The fare media may be sensed in a ticket transport or swipe reader.

Application and Results

This equipment controls entry or entry and exit by magnetic sensing or magnetic sensing and recording on the fare media. It is applied in barrier rail systems in both zone and flat fare structures. Reliability is in the 4,000 to 40,000 MCBF range. It is employed in a large number of all magnetic ticket barrier systems and in the MET system tests presently being conducted by the TTC.

Strengths and Weaknesses

High capital, operating and maintenance costs distinguish this equipment. It is very flexible in the different types of fare media that can be handled. It maintains a detailed record of all transactions. It can be remotely monitored and controlled.

Passenger Entry and Exit Control - Coin and Token Gates

Coins/tokens or tokens only are sensed to release the barrier. These gates are usually employed in a flat fare structure, as with TTC.

Applications and Results

This equipment is applied in barrier rail systems. Reliability is in the 5,000 to 50,000 MCBF range. It is employed in a large number systems such as TTC (Toronto) and together with magnetic fare media at MARTA (Atlanta) and MDCTA (Miami).

Strengths and Weaknesses

The equipment requires lower capital and maintenance costs than for magnetic fare media gates. Operating costs are likely to be greater than magnetic fare media gates. It is relatively limited in flexibility although use of electronic coin acceptors enables a wide range of fare levels to be accommodated. Record keeping and remote monitoring and control are usually more restricted than with magnetic fare media gates.

ON-BOARD VEHICLE EQUIPMENT

The fare collection equipment described below is for installation on-board transit vehicles and it includes equipment to produce tickets, accept and verify fare payment, and cancel multi-ride tickets.

Operator Vending of Fare Media - Electro-Mechanical Ticket Issuers

These units print tickets or transfers. Control over their use is provided through the information which is printed on each ticket/transfer issued. The information printed on the ticket can include date, time, route, direction and zone. A duplicate hard copy record of the key ticket information is also retained on a separate paper roll.

Application and Results

There are a few properties in North America which use electro-mechanical units to issue transfers. GO Transit uses this type of equipment to issue single-ride tickets. Due to obsolescence, most of this equipment will be replaced with electronic units or some other ticketing system in the future.

Strengths and Weaknesses

These machines are usually heavy and cumbersome and have been costly to repair since spare parts are no longer manufactured.

Operator Vending of Fare Media - Electronic Ticket Issuers

These ticket issuing machines are controlled by a microprocessor. They can store fare tables so the operator need only key in the destination and the fare is produced. The transactions are recorded on a cassette or solid state module. It may be possible to validate prepurchased tickets.

Application and Results

GO Transit will test electronic ticket issuing machines on a number of their buses in 1985. The machines are used extensively in England, parts of Europe and in the Far East, so they have been proven in revenue service. The same basic unit can become a Booking Office Machine.

Strengths and Weaknesses

The electronic ticket issuing machines maintain strict accountability, by operator, of all tickets issued. Their data storage can be fed directly into a computer. The fare tables and other stored information can be down loaded from a computer prepared cassette or solid state module. They do not handle money so are quite reliable, with the matrix printer being the component requiring the most maintenance.

Operator Vending of Fare Media - Magnetic Transfer Issuers

These units, which are under development and have not yet been proven in revenue service, will issue magnetically encoded transfers from on-board a vehicle. The transfers will be used to gain entry to a rapid transit system that uses magnetic ticket entry and exit gates. Such units could produce transfers to be used in the TTC subway stations if TTC implements the MET system.

Fare Acceptance and Verification - Non-Registering Fare Boxes

There are three types of non-registering fare box in use throughout North America. In the first, the bills, tickets, coins and tokens are deposited together in a single cashbox. In the second, the bills and tickets are kept in a separate compartment of the cashbox from the coins and tokens. While there is no registration, there are inspection areas so that the operator can visually check the fare media deposited. The third type accepts coins/tokens only (no tickets or bills) and has vacuum extraction to remove the fare media from the farebox.

Application and Results

Most carriers in the Metro Toronto Region have the first type of farebox which is usually not suitable for accepting bills. TTC is procuring new fareboxes of the first type which have the ability to handle bills without jamming. More recently, the second type has gone into use due to the higher fares and increased use of dollar bills for fare payment. The third type is only employed in special situations as the vacuum extraction system cannot accept bills and tickets (the vacuum unit shreds them). There is little maintenance required in the first type, perhaps one person per 200 fareboxes in the second and about the same for the third type.

Strengths and Weaknesses

With the first type of farebox, dollar bills are usually folded or crushed with many half bills being disguised by folding, so that flattening and facing the bills is labour intensive and revenue is lost from the half bills. In the second type, the bills can only be inserted flat, and while they do not have to be oriented, there is less labour involved in facing them than with the first type, and less revenue loss. The third type is susceptible to skimming as ways have been found to direct the flow of coins away from the sorter when they are being extracted.

Fare Acceptance and Verification - Registering Fareboxes

There are two types of registering fareboxes - mechanical and electronic. The mechanical type is associated with vacuum extraction and it accepts only coins and tokens. The electronic registering fareboxes count and register coins, tokens, bills and tickets separately and also enable data to be recorded by manual operation of a key pad on the farebox. In these fareboxes, the bills and tickets are kept separately from the coins and tokens.

Application and Results

There are practically no new orders for mechanical registering fareboxes. Electronic registering fareboxes are in use in perhaps 20 properties in the United States and Canada. The first generation electronic fareboxes were quite inaccurate and unreliable. The second generation is much improved with system accuracy of better than ±0.5%. Maintenance requires about one person per 100 fareboxes.

Strengths and Weaknesses

Registering fareboxes provide greater revenue protection than non-registering fareboxes. The amount of fare media to be physically counted in the money room is known before the counting takes place. In electronic registering fareboxes, the data, such as pass usage, transfers accepted and concession fares paid, can be recorded by the touch of a key. The amount of fare deposited is displayed to both the operator and passenger so less short fares result. The receiver/bin equipment in the garage is more secure than for the vacuum extraction system and, in addition, requires less handling than individual cashboxes which have to be opened manually in the first type of non-registering fareboxes.

Multi-Ride Ticket Cancellation - Electro-Mechanical and Electronic Cancellors

The cancellors which are described in the station equipment section have also been widely used in on-vehicle applications.

Multi-Ride Ticket Cancellation - Magnetic Cancellors

The magnetic cancellors described in the station equipment section have received some testing on-board buses but have not been proven in revenue service. It is anticipated that they are three to five years away from extended revenue service.

GARAGE EQUIPMENT

The equipment described below is normally located in the transit garage, it is associated with the processing control of fare revenue.

Revenue Collection and Transfer - Cashbox Receivers and Bins

Specialized cashbox receivers and bins have been developed for use with electronic fare registering fareboxes and with the second type of non-registering farebox which has separate compartments for coins and tickets/bills.

The bin is contained within a receiver which enables the vaults to be emptied in the bin without the contents being exposed or the money handled. The bin is sealed when removed from the receiver so that the first time the contents of the vaults are exposed is when the bin is opened in the cash-counting room. The receiver and bin maintain the separation between tickets/bills and coins/tokens.

Application and Results

The receiver and bins equipment has operated quite reliably in a large number of transit properties.

Strengths and Weaknesses

The receivers and bins provide higher security than most key operated vaults in vacuum extraction systems. They provide a secure means of consolidating the revenue at a garage and the bins are designed to withstand rough handling in transporting them from garages to the money room.

Revenue Collection and Transfer - Audit Units

A small version of the Receiver/Bins is available for emptying individual vaults as an audit check. The receiver mechanism is the same as in the Receiver/Bins but the bin is not as secure on the audit unit as with the larger receiver/bins and is designed to be used in a secure room..

Application and Results

The audit units are useful in sampling individual farebox revenue and are helpful in tracking down any discrepancies which arise between electronic and manual counts. They can be used in small properties instead of Receiver/Bins.

Strengths and Weaknesses

The audit units enable audits to be performed periodically on a scheduled basis so that every vault can be individually checked perhaps every month or so. The individual vaults must be transported to the money room unopened to make the audit.

Data Collection Equipment - Electronic Probes

Data is extracted from electronic registering fareboxes by a probe which is operated when the cashbox is removed from the farebox. The extracted data is stored in a microcomputer.

Application and Results

The probes offered today are optical to avoid the short life and open circuits of mechanical probes. The contact time is approximately one second and a signal signifies completion of accurate data transmission. The probe is very reliable and designed to stand the severe shock of dropping on concrete from several feet. The probe can also be used to down load data from the computer to the fareboxes at the time of a fare change. It can also be employed as an electronic key to release the vault from the farebox. A number of properties are using the electronic key feature.

Strengths and Weaknesses

If the probe is used as an electronic key, there must be a back-up battery operated probe to use when the computer is inoperative or power is disrupted. The farebox design must be such that when the electronic lock circuitry fails in the farebox, a maintenance person can fix it by opening the top of the farebox. This action, however, must not allow entry into the cashbox.

Data Collection Equipment - Data Processing Computers

A micro computer is used to collect the electronic registering farebox data at the garage. This computer can also be used to extract the data stored in the cassettes or solid state modules of the Ticket Issuing Machines. This computer can display and print out reports and can also be linked to a central computer.

Application and Results

Data collection computers are operating very reliably at properties which have electronic registering fareboxes, to produce financial, statistical and maintenance reports.

Strengths and Weaknesses

The computer needs an "office" environment in the garage and appropriately trained people to use it. Considerable latitude is available in the make-up of displays and reports.

OFF-PREMISES EQUIPMENT

The following equipment is used to provide tickets at various locations not operated by transit property personnel.

Agent Vending of Fare Media - Booking Office Machines (BOMs)

BOMs similar to those covered in the Station Equipment section can be operated by ticket agency offices or by other outlets authorized to use them.

Self-Service Vending of Fare Media - Ticket Vending Machines (TVMs)

TVMs similar to those covered in the Station Equipment section can be installed off-premises. Such machines are presently operating in Portland and Sacramento. More are planned there and in other cities.

Self-Service Vending of Fare Media - Automatic Teller Machines (ATMs)

ATMs are in widespread use by banks and trust companies to dispense cash, deposit to accounts, transfer between accounts and pay certain bills. These machines can be considered for a number of other uses and these other uses are under active study by the owners of the equipment. One such use is to dispense pre-printed or pre-encoded transit media such as monthly passes and stored value magnetic tickets.

ATMs are being modified for trial applications of this type to dispense stored value tickets in BART stations in San Francisco and to dispense monthly passes at selected locations in Seattle.

Self-Service Vending of Fare Media - Credit Card Operated TVMs

The Long Island Railroad in New York is planning to test credit card operated TVMs in the near future. National credit cards would be accepted and the TVMs would issue weekly and monthly passes of various values (for the zones travelled). Such machines are now in use to vend airline tickets for some regional airlines in the United States.

CONTROL CENTRE EQUIPMENT

The equipment described below is used to collect fare related data, to communicate that data between the collection and processing equipment. and to process and exercise supervisory control over fare collection equipment.

Data Acquisition Devices

Data acquisition computers are used to collect operating data on revenue, ridership, maintenance and security and to feed back certain instructions to fare collection equipment such as fare changes, invalid pass numbers, etc. They are in use in a number of transit properties which operate microprocessor-based fare collection equipment, including electronic gates, booking office machines, and multi-ride cancellors. This type of equipment will be part of the fare collection demonstration project on the GO Transit bus and rail services planned for 1985.

Data Communications Equipment

Modems (modulators/demodulators) and communications links between microprocessor based fare collection equipment and control centre data collection equipment are utilized in a number of transit properties. This communication system can be through dedicated telephone lines or can employ an automatic dial-up feature, with the telephone line being shared between voice and data transmissions. The automatic dial-up type feature will be part of the GO Transit fare collection demonstration in 1985 and will soon be installed in Baltimore for communications between rapid transit station fare collection equipment and the central control computers.

Monitoring and Control Computers

These computers are used to monitor and control the fare collection equipment in rail stations and are now in use in several rail systems which employ magnetic ticket gate technology. They will also be employed by the Niagara Frontier Transit Authority Light Rail Service in Buffalo and on the downtown people mover system in Detroit. The GO Transit fare collection demonstration will employ in-station monitoring equipment as part of the Milton line fare collection demonstration in 1985.

SUMMARY

A wide array of equipment commonly in public transit fare collection systems or developed and ready for use in fare collection systems has been described in a general way in this chapter. These descriptions have been meant to provide an overview of this equipment and further assessment of the suitability and feasibility of the equipment will be required before its application can be considered in the Metro Toronto region.

4. REVENUE AND COST SHARING POSSIBILITIES

The degree to which revenue and cost sharing between carriers will be required depends on the degree of fare integration and the way in which it is operated. Initial fare integration efforts could conceivably only require an agreement between the participating operators to share revenues according to a fixed formula which is acceptable to both parties. More extensive fare integration schemes however may require some form of passenger counting to establish revenue sharing and could possibly involve the assumption of certain operating costs between operators depending on which operator provides cross-boundary services.

This section of the report summarizes the points relating to revenue and cost sharing which were raised in the manager and policy interviews; it reviews the experience of other jurisdictions in this area; and it outlines in general some alternative models which can be considered later in the study when specific fare integration alternatives are being assessed.

MANAGER AND POLICY INTERVIEW RESULTS

A number of points were raised during the interviews with managers and with policy level staff which will have an important bearing on consideration of revenue and/or cost sharing within a fare integration scheme in this Region. These are discussed in the Volume 1 Report (Review of Existing Policies and Systems) and are summarized briefly below.

It was generally felt that the current cross-boundary subsidy program, while achieving the initial objectives, would require modifications for longer term application. Specifically, the inefficiency of duplicate transit services and the lack of financial accountability at the local level would promote consideration of modifications.

Most local and regional municipalities were concerned about the potential negative financial impacts of fare integration schemes. Specifically, they did not want to bear the total cost of any lost revenue from local tax revenues and they did not want to subsidize transit riders from other municipalities. There was a general expectation that the Province would have to provide a safety net in this respect.

While there were some suggestions that a single agency operating all public transit services in the Region might be the ultimate solution, this point of view was outweighed by the very strong sense that most municipalities wish to protect the autonomy and financial integrity of their local public transit systems.

It was generally accepted that fares should reflect the quality of service and different fares for the same trip were acceptable if the quality of service of the two options was different. Specifically, it was recognized that the high quality of service provided by GO Transit within local municipalities justified a premium fare compared with the fares changed by local transit services.

There was some feeling that the varying rates of Provincial subsidy for mature versus newer public transit systems might cause some problems in achieving fare and service integration between local municipalities. Stated another way, if there was a joint service with a common fare for cross-boundary trips, it would be difficult to justify subsidizing one municipality at a different rate than the partner in the service.

In all of the Regions except Metropolitan Toronto and Hamilton-Wentworth, public transit is a local government responsibility. Some comments indicated that since fare integration involved inter-regional travel, regional governments might legitimately play a role in formulating and administrating fare integration agreements.

The above issues are only noted at this time and they would have to be given more careful consideration in the formulation and evaluation of alternative fare integration schemes as they are developed.

EXPERIENCE IN OTHER JURISDICTIONS

The redistribution of fare revenue and the responsibility for operating costs of public transit services involved in fare integration in the jurisdictions we surveyed were handled in a relatively straight forward manner in all cases. In London, Tyne & Wear, and Perth, a single agency has full operational and financial responsibility for the services that were fare integrated and therefore the question of assignment of fare revenue and operating costs was only important for the comparison of the financial performance of various routes and services.

A somewhat similar situation exists in the Netherlands and the Rhine-Ruhr Region where a single agency has financial responsibility for all public transit services involved in fare integration. In the Netherlands, the Central Government contracts for the service and is responsible for the operating costs and receives all fare revenue. In the Rhine-Ruhr Region fare revenue is retained by the individual carriers and is reported to a central coordinating group who are responsible for subsidizing the difference between costs and revenues, where costs are calculated according to a standard formula.

In Munich, San Francisco and San Diego the individual carriers are each responsible for their own financial performance. In each case some of the fare revenue accrues to a central coordinating agency which redistributes it to the individual carriers on a formula basis. In Munich the formula provides for compensation according to the quantity of service provided by each carrier and in San Diego the distribution is according to actual passenger use. In both cases, the redistribution system seems to work effectively.

In the Paris region, where fare integration has been implemented around the "carte orange" period pass, shortfalls from the discounts associated with the carte orange are paid to the major operators from the proceeds of a unique employment tax. The national government in France plays a major financial and organizational role in the provision of public transit in the Paris region.

In summary, there are a number of similarities between many of the jurisdictions surveyed in the way in which passenger and subsidy revenue is distributed. There are also some unique examples. In all cases, however, the arrangements for revenue distribution and/or cost assumptions were simple, easily understood and easy to administer.

SPECIFIC REVENUE AND COST SHARING POSSIBILITIES FOR THE METRO TORONTO REGION

As noted in the discussion of experience in other jurisdictions, fare integration in a region under a single transit agency poses no problems of revenue or cost sharing because all revenues and costs are pooled. While such an agency may assign costs and revenues to different routes and services, this is only done to compare their financial performance for management purposes.

In a region served by a number of transit properties, any fare integration measure which changes existing revenue-cost relationships will call for some kind of revenue or cost sharing to compensate.

In the Metro Toronto region the transit properties have widely different revenue-cost ratios and all require subsidy as well as fare revenue to meet operating costs. This means that sharing arrangements under fare integration could be made with respect to the following financial parameters:

1. fare revenues;
2. subsidies;

3. operating costs;
4. capital costs, or,
5. various combinations of the above.

These options are discussed below.

1. Sharing Fare Revenues

When one ticket or pass pays for a ride on two or more transit systems, some way of distributing the resulting fare revenue among the operators involved is called for. Such tickets or passes may be sold by a central agency or by each operator. In the latter case, sales revenue will usually be reported or handed over to a coordinating agency for redistribution. The distribution may be made on various bases, including the following:

Continuous Passenger Counts

All passengers using such tickets or passes are counted by all carriers. This is the method used on buses to determine the distribution of Ready Pass revenues in San Diego. On systems using fares by distance, the passenger miles or kilometres involved may have to be determined.

Periodic Passenger Counts

Same as above, but the passengers are counted only on selected days. Counts can be taken weekly, monthly, annually or sporadically.

Passenger Counts on Selected Routes

As above, but the counts are made only on selected routes. The routes may be changed periodically or on a rotating basis.

Passenger Counts at Key Locations

As above, but the counts are made only at key locations such as transfer points or major terminals.

Periodic Full Surveys

Such surveys count all passengers on a given day or adjoining days, thus determining the necessary passenger characteristics at that time, including the proportion of riders using fare-integrated tickets or passes for trips on two or more systems. Full surveys are usually only taken every year or two because of their cost. They don't always succeed in counting all passengers, but usually get a high proportion. They may be taken by one operator at a time or by all the operators in an area at once.

Full Surveys on Selected Facilities

As above, but only certain facilities such as the subway system or commuter rail lines are surveyed.

Continuous Sample Surveys

These are sample surveys taken on a daily basis at key locations in a transit system. The locations and the survey content may be varied from time to time or on a rotating basis. Because they are less costly than full surveys and can concentrate on a few passengers, sample surveys can be used to obtain more detailed information than would otherwise be available. Such surveys are evidently used on the San Diego Trolley to help determine the distribution of Ready Pass revenues in San Diego.

Periodic Sample Surveys

As above, but the sampling is done only periodically, either at regular intervals or sporadically. The locations surveyed can be kept the same or varied, perhaps on a rotating basis.

Transit Service Provided

Instead of distributing integrated-fare revenues according to the rides or passenger miles they result in on different carriers, some regions distribute them according to the amount of transit service each carrier provides. Service is usually measured in terms of route miles (or kilometres), train miles, vehicle miles, or seat miles. The advantage of this approach is that the statistics are much easier to obtain than passenger statistics. The disadvantage is that such measures of the amount of service provided may not correspond very closely to the amount of service consumed (passengers or passenger miles) which is what generates the fare revenue. This is the method used to distribute fare revenues in Munich where vehicle kilometres are employed.

Simple Agreement

Instead of passenger statistics or measures of service, a simple agreement on shares could serve as the basis for distributing fare revenues. For example, if it is assumed that tickets or passes covering rides on two adjacent flat-fare systems will be used for relatively equal numbers of trips on both systems, the agreement could simply split each property's revenue from such sales on a 50:50 basis between the two properties. Other ratios might be agreed to depending on the circumstances, of course. As long as the parties felt the agreement to be equitable, it could provide for satisfactory distribution of fare revenues without the costs and difficulties involved in the more sophisticated approaches discussed above. And it might prove to be about as fair.

No Redistribution

Finally, it would be possible to simply let each property keep the revenue from any fare-integrated tickets or passes that it sells, on the assumption that such sales will tend to correspond closely enough with transit use in the long run to make complex revenue redistribution not worthwhile. This is the approach taken in San Diego to all fare revenues except those from Ready Pass sales.

2. Sharing Subsidies

Since subsidies and fare revenues are both required to meet the costs of all transit systems in the Toronto region, subsidies instead of fare revenues could be distributed so as to compensate for the effects of fare integration on the different transit systems. Some examples of such use of subsidies came to light in the survey of experience in other jurisdictions.

The Rhine-Ruhr Example

The best example is probably found in the Rhine-Ruhr region, where each operator keeps all the fare revenues it collects and simply reports the amount to a central coordinating body, which then pays each operator a subsidy equal to the difference between its costs and revenues. The costs are calculated by a standard formula which takes into account operating costs and a return on investment. This approach is somewhat similar to the Ontario Government's transit subsidy program except that the Ontario Government subsidizes only a proportion of the net cost (deficit), with this proportion depending on the extent to which the transit operation achieves, exceeds, or falls short of a target revenue/cost ratio. This approach is meant to reward transit properties that attain a high revenue cost ratio and to reduce the proportionate subsidy for those that fall short of their target revenue/cost ratio.

The Proposed Consolidated Pass in San Francisco

Under the proposal for a joint AC/BART/MUNI consolidated pass, each system would receive as revenue an amount equal to the cost of its own pass. The discount on the joint pass would be recouped from a regional transit subsidy fund, thus subsidizing each operator so that its revenue-cost ratio is not reduced.

The Paris Region Experience

A variety of different subsidies are applied to carriers in the Paris region. The principle subsidy which covers the fare discounts associated with the Carte Orange fare integration scheme comes from an employment tax and is meant to subsidize the carriers for the difference between a full fare and the discounted price of the Carte Orange. This is part of a broader program of subsidies which contain both specific subsidies (e.g. to cover fare discounts for particular fare categories like the elderly) and general subsidies which are designed to maintain fare increases below the level of operating cost inflation.

Munich's Problem with Revenue Distribution

The original agreement for the Munich Transport Community provided that each partner would receive a share of fare revenue proportionate to the vehicle kilometres of service provided, but this led to complaints of inequity by the commuter system, since its costs per vehicle kilometre are considerably higher than those of the urban system. Since each partner is separately subsidized (the commuter system by the Federal Government and the urban system by the City of Munich), this cost difference had to be covered by greater Federal subsidies. It is not known if or how this issue has been resolved, but it serves to point up the close inter-relationships between fare revenue and subsidy distribution.

GO Transit Experience

This inter-relationship is also evident in the GO Transit fare integration schemes, whereby GO Transit subsidizes local transit operators 75% of their adult single ride fare for each GO Transit passenger carried free to and from GO rail stations. Since these schemes have not brought any significant increase in GO Transit ridership, and since GO Transit fares have not been increased to cover the subsidies paid to local operators, these subsidies have evidently added to the overall subsidy required by GO Transit. If this is so, it means the costs of these fare integration schemes are borne by subsidies (Mississauga being a partial exception because of the supplemental charge paid by riders to Mississauga Transit). However, fares might some day be raised so as to cover them at least in part. Should this happen, the question of whether the fare revenue increases involved are being equitably levied and distributed could arise.

3. Sharing Operating Costs

Probably the most important sharing of operating costs found in connection with fare integration schemes is in relation to the central administration activities required to coordinate fare matters and to distribute fare revenues and/or subsidies among the participating transit systems. Examples are found in Munich, Rhine-Ruhr, San Francisco and San Diego.

Munich

In the Munich Transit Union, all fare revenues accrue to the central administrative body which deducts its costs of operation from the total before distributing the remainder among the federation partners. These costs of operation are thus shared by the partners in proportion to their contributions to total fare revenue.

Rhine-Rhur

In the Rhine-Ruhr region fare revenues are not pooled or redistributed, so the central agency's costs are in effect covered out of subsidies. If it is assumed that this reduces the subsidies which go to the partners, they may be said to indirectly share the costs of the central agency in proportion to the subsidies they receive.

San Francisco and San Diego

Planning and administration costs in connection with fare integration in San Francisco and San Diego appear to be covered out of subsidies, similar to the Rhine-Ruhr situation. Although Ready Pass revenues in San Diego are distributed by the San Diego Association of Governments (SANDAG), there is no indication that any of the costs of doing so are taken out of the Ready Pass revenues.

4. Sharing Capital Costs

Most of the fare integration schemes studied have required costly fare vending, cancelling and collecting equipment to achieve greatest passenger convenience and efficiency. In financing such equipment it is necessary to determine how much of this cost will be covered by subsidies and how much by fare revenues, and for the latter how much each operator will contribute.

5. Combinations

Various combinations of the above alternatives would be possible of course, and some might prove especially suitable for the particular conditions in the Toronto region. Consideration might be given to the possibility of combining a fare revenue alternative with a subsidy or cost alternative, as well as to possible combinations within each of these fields.

If it is decided to proceed with fare integration in this region, there seems little doubt that satisfactory arrangements for revenue and/or cost sharing can be worked out, based on the considerable body of experience that now exists from other jurisdictions.

APPENDIX A

ADJUSTMENT FACTOR FOR ESTIMATING DISAGGREGATE FARE ELASTICITIES FROM AGGREGATE VALUES

(SOURCE: Patronage Impacts of Changes in Transit Fares and Services; U.S. Department of Transportation, September, 1980)

EXHIBIT A-1

ADJUSTMENT FACTORS FOR ESTIMATING DISAGGREGATE FARE ELASTICITIES FROM AGGREGATE VALUES

DISAGGREGATE GROUP	ADJUSTMENT FACTOR
	MULTIPLY AGGREGATE ELASTICITY BY:
Transit Mode	
Bus	1.57
Rapid Rail	0.72
Trip Length	
Short-distance	1.43
Long-distance	0.66
Route Type	
Intra-CBD	1.39
Intrasuburban	1.32
Non-CBD Oriented	1.16
CBD Oriented	0.56
Time Period	
Off-Peak	1.38
Peak	0.59
Trip Purpose	
Shop	1.29
Work	0.50
Ridership Type	
Choice	1.31
Captive	0.63
Rider's Income	
High	1.67
Medium	1.13
Low	0.72
Rider's Age	
1-16 years	1.37
17-24 years	1.15
25-44 years	0.70
45-65 years	0.63
65+ years	0.59

EXHIBIT A-2

ADJUSTMENT FACTORS FOR ESTIMATING DISAGGREGATE SERVICE ELASTICITIES FROM AGGREGATE VALUES

SERVICE VARIABLE AND DISAGGREGATE GROUP (Aggregate Elasticity)	ADJUSTMENT FACTOR MULTIPLY AGGREGATE SERVICE ELASTICITY BY:
BUS IN-VEHICLE TIME (-0.35 ± 0.21)	
Time Period	
Off-Peak	1.38
Peak (Reverse Commute)	0.92
Peak Direction	0.73
Route Type	
Non-CBD Oriented	1.13
CBD Oriented	0.90
Trip Purpose	
Work	1.52
Non-work	0.33
COMMUTER-RAIL IN-VEHICLE TIME (-0.59 ± 0.28)	
Route Length	
More than 25 miles	1.54
Less than 25 miles	0.88
WALK TIME TO BUS (-0.20 ± 0.06)	
Route Type	
Non-CBD Oriented	1.23
CBD Oriented	0.84
Trip Purpose	
Work	1.26
Non-work	0.66
WAIT TIME FOR BUS (-0.26 ± 0.14)	
Route Type	
Non-CBD Oriented	1.41
CBD Oriented	0.66
Trip Purpose	
Work	1.21
Non-work	0.72

EXHIBIT A-2
(Continued)

SERVICE VARIABLE AND DISAGGREGATE GROUP (Aggregate Elasticity)	ADJUSTMENT FACTOR MULTIPLY AGGREGATE SERVICE ELASTICITY BY:
BUS HEADWAYS (-0.47 ± 0.21)	
Time Period	
Off-Peak	1.10
Peak	0.63
Service Level	
Low (more than 50 minutes)	1.32
Medium (10-50 minutes)	1.05
High (less than 10 minutes)	0.50
COMMUTER-RAIL HEADWAYS (-0.47 ± 0.14)	
Time Period	
Off-Peak	1.41
Peak	0.79
Service Level	
Low (more than 50 minutes)	1.52
Medium (10-50 minutes)	0.82
VEHICLE-MILES (+0.61 ± 0.31)	
Time Period	
Off-Peak	1.19
Peak	0.62
Transit Mode	
Bus	1.21
Rapid Rail	0.57
Route Type	
Intrasuburban	1.19
Central City	0.85
CBD Oriented	0.76

Volume

4

Ontario

Ministry of
Transportation and
Communications

TRANSIT FARE INTEGRATION IN THE TORONTO AREA - PHASE II

Summary of Highlights and Comments

Volume 4

MARCH 1985

IBI
GROUP

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

TRANSIT FARE INTEGRATION IN THE TORONTO AREA - PHASE II

SUMMARY OF HIGHLIGHTS AND COMMENTS
VOLUME 4

IBI GROUP
in Association with
J.W. Leas & Associates
and
Paterson Planning and Research Limited

March, 1985

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1. INTRODUCTION

The work carried out on this study of fare integration potential in the Metropolitan Toronto Region, comprising the urban and regional commuter transit systems in the Regions of Hamilton-Wentworth, Halton, Peel, York, Durham and Metropolitan Toronto, is documented in the first three volumes of this report series:

- Volume 1 - Review of Existing Policies and Systems, March, 1985
- Volume 2 - Review of Developments in Other Jurisdictions, March, 1985
- Volume 3 - Future Situation Review, March, 1985.

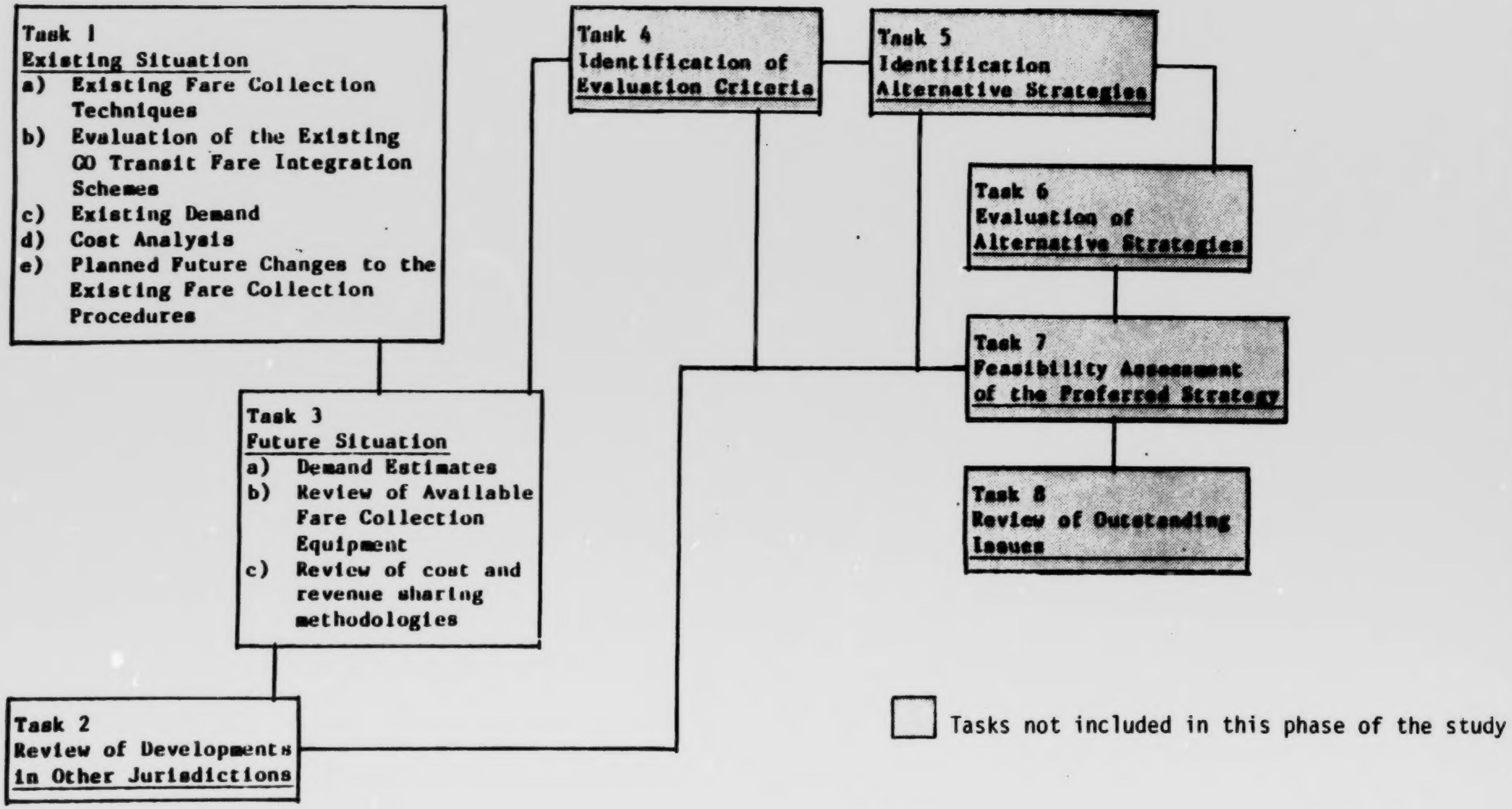
The purpose of this fourth volume is to highlight some of the findings from the previous three volumes and to provide some preliminary comments on these highlights. Exhibit 1.1 describes the context for this study. It included the first three tasks of an eight task project phase, as follows:

- Task 1 - a review of existing fare collection policies and systems within the study area;
- Task 2 - a review of fare integration experience in other jurisdictions around the world;
- Task 3 - development of information to assist in the subsequent identification of alternative fare integration strategies.

This study is therefore concerned with only one aspect of regional transit integration. It results obviously can't be treated in isolation from the other important elements, that is service integration and subsidy policy.

EXHIBIT 1.1

FARE INTEGRATION STUDY WORK FLOW


Task 1
Existing Situation
a) Existing Fare Collection Techniques
b) Evaluation of the Existing GO Transit Fare Integration Schemes
c) Existing Demand
d) Cost Analysis
e) Planned Future Changes to the Existing Fare Collection Procedures
Task 2
Review of Developments in Other Jurisdictions
Task 3
Future Situation
a) Demand Estimates
b) Review of Available Fare Collection Equipment
c) Review of cost and revenue sharing methodologies
Task 4
Identification of Evaluation Criteria
Task 5
Identification Alternative Strategies
Task 6
Evaluation of Alternative Strategies
Task 7
Feasibility Assessment of the Preferred Strategy
Task 8
Review of Outstanding Issues
Tasks not included in this phase of the study

The reports referenced above should be seen as providing the background information for the future development and evaluation of fare integration strategies as part of a larger effort aimed at achieving improved public transit system integration within this large metropolitan region.

2. SUMMARY OF HIGHLIGHTS AND COMMENTS

EXISTING POLICIES AND SYSTEMS

All transit properties operating within the study area recognize four principal categories of passengers:

- adult;
- student;
- senior;
- child.

In addition, GO Transit and the TTC have a family or group fare category. A variety of other concessionary fare categories are used including the blind, persons on social assistance, and the unemployed.

There is a wide variety of definitions on these categories, particularly for students and children. In several municipalities, senior citizens and students must evidence proof that they are resident in the municipality to obtain the concessionary fares.

Depending on the nature of fare integration, these definitions might have to be rationalized and reconciled to provide a uniform basis for a fare structure.

There is a significant variation in the discounts available for prepaid and concessionary fares. For example, seniors single fares vary from 50% to 100% of the adult single fare. However, where the senior must pay a full adult fare on a single ride, there are often very substantial discounts available for multi-ride tickets/tokens and period passes.

A summary of the range of discounts available for prepaid fares in the local transit systems operating within the study area is provided in Exhibit 2.1. This wide range of applicable fares could conceivably deter fare integration, however those transit properties charging the lower fares inevitably offer a significantly lower level of service, as indicated by route coverage, frequency of service and the geographic size of the service area within which the fare applies.

Another factor of importance when considering fare integration is the maturity and compatibility between adjacent transit systems. The proportion of total ridership which is adult passengers is one indication of the maturity of a transit system, with this range varying from 75% adult to 25% adult across the region. Another measure is the revenue cost ratio which ranges from 67% to a low of 20%.

It is clear from the comments that were made by some of the managers and policy level staff who were interviewed as part of this assessment, that the financial and ridership performance of many of those systems on the low end of the performance scale could be improved substantially through service and fare integration with adjacent systems that exhibit more mature performance. The obvious question here is whether or not good value is being received for the subsidy involved in those local transit systems which have low revenue and passenger performance.

Impact of GO Transit Fare Integration

One very important demonstration of fare integration in this region has been implemented by GO Transit. To date this demonstration has included six participating local transit systems in Burlington, Oakville, Brampton, Mississauga (partial), Pickering and Richmond Hill (partial). As indicated in Exhibit 2.2, the impact of full fare and service integration, and particularly the growth in the local bus share over the two year period 1981 to 1983, has been quite dramatic. This can be contrasted with the results of partial fare and/or service integration and those which have no fare or service integration. Clearly GO Transit has demonstrated the potential impact of this one model of fare integration.

EXHIBIT 2.1

PREPAID DISCOUNTED FARES
(LOCAL TRANSIT SYSTEMS)

	RANGE OF FARES
ADULT	40¢ TO 80¢
SENIOR	20¢ TO 45¢
STUDENT	20¢ TO 70¢
CHILD	20¢ TO 60¢

EXHIBIT 2.2

IMPACT OF GO TRANSIT FARE INTEGRATION

	STATION	LOCAL BUS ACCESS (%)	
		1981	1983
FULL FARE INTEGRATION	BRAMPTON	20.3	29.7
	PICKERING	6.9	21.7
	OAKVILLE	28.8	41.5
	TOTAL	17.6	30.7
PARTIAL FARE AND/OR SERVICE INTEGRATION	RICHMOND HILL	0.9	2.8
	PORT CREDIT	10.2	15.8
	MALTON	3.2	2.9
	MEADOWVALE	--	13.6
	TOTAL	8.8	13.6
NO INTEGRATION	SCARBOROUGH	0.9	2.3
	GUILDWOOD	1.7	3.9
	TOTAL	1.5	3.4

Comparison of Local and GO Transit Fares

Exhibit 2.3 shows the range of adult single ride fares on local transit, for trips which are entirely within the local municipal boundaries, and for trips across the Metro boundary involving payment of a double fare and a transfer to/from the TTC. The double fare is equivalent to the GO Transit fare structure for short and medium distance commute trips up to about 16 km. Since the GO Transit fare structure is geared to long distance trips, this exhibit dramatically shows the inequity of the double fare for short distance cross boundary trips. The importance of these short distance cross boundary trips are discussed later in this report.

Origins of Commuters

Exhibit 2.4 presents information from origin and destination surveys undertaken by Mississauga, the York Region and the TTC. It shows the proportion of work trips from municipalities adjacent to Metropolitan Toronto to destinations within Metro. Of importance is that the proportion of trips to the adjacent Metro boroughs (e.g. Mississauga work trips to Etobicoke), is equal to the proportion destined to Central Toronto. This is a significant fact because longer distance trips to the Central Area are well served by both regional and local transit systems and these systems carry approximately 60% of the work trips destined to the Central Area from the adjacent outlying municipalities. On the other hand, partly because of poor transit service and no fare integration, the shorter distance cross boundary trips are served overwhelming by the automobile mode, with transit carrying only about 10% of the trips.

Demand Characteristics

While 35% of the labour force in the municipalities surrounding Metro Toronto commute to jobs in Metro, it is equally important that a

EXHIBIT 2.3

COMPARISON OF LOCAL AND GO TRANSIT FARES

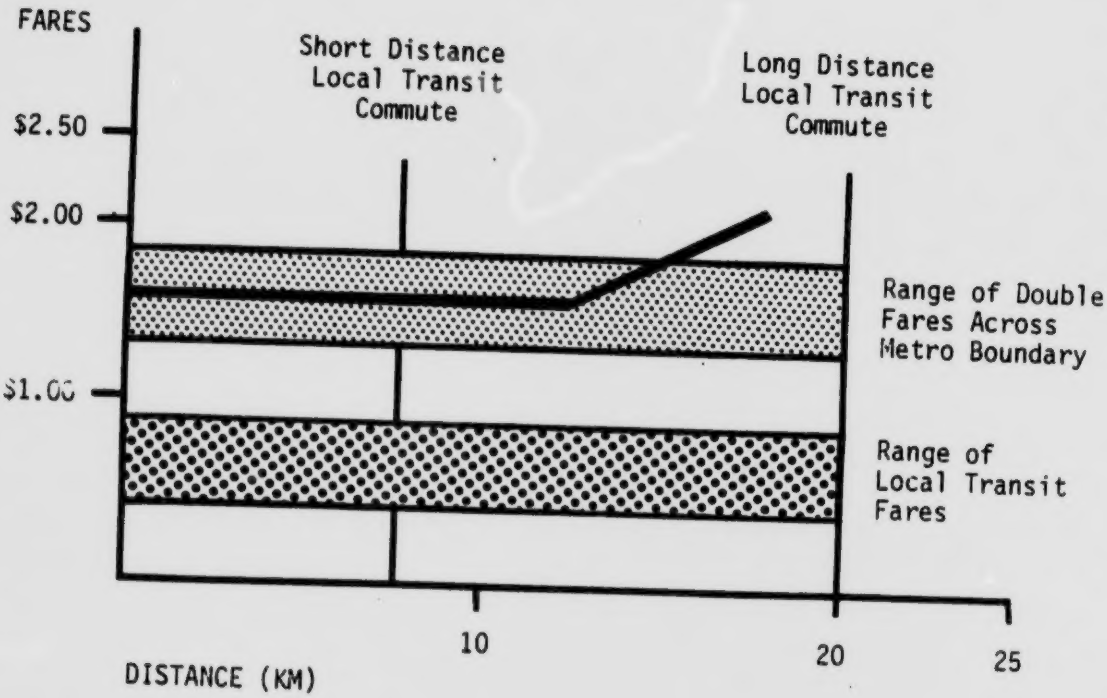
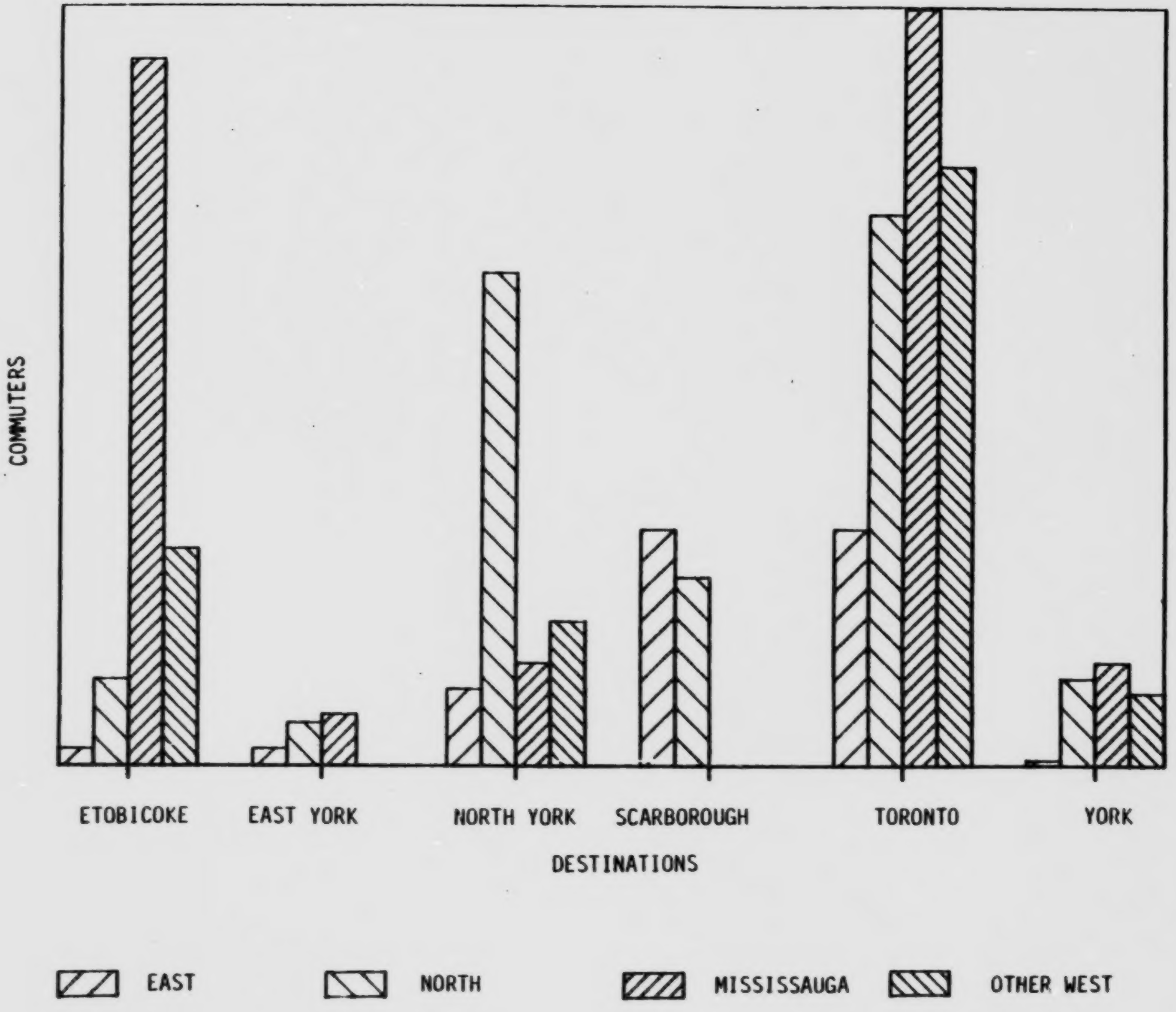


EXHIBIT 2.4

ORIGINS OF COMMUTERS



growing proportion of the labour force resident in Metro commute to jobs in the surrounding municipalities as the employment base in these municipalities is developed.

Transit Managers' Comments

The managers of the 17 transit properties that operate within the study area were interviewed to determine their perception of the need for improved fare integration. Many managers commented on specific service and fare integration issues which they felt merited further attention. They also indicated that these issues were difficult to deal with at the local government level, because of the local political perception that municipal transit systems are meant to serve only the residents of each municipality, making issues of cross-boundary service and fare integration difficult to resolve at the local level.

Concern was also expressed about the potential financial impact that fare integration would have on the local transit deficit and particularly on the local contribution in support of the deficit.

Because of the importance of these issues, several managers advocated a strong leadership role by the Province in resolving the issues.

EXPERIENCE IN OTHER JURISDICTIONS

The purpose of our survey of other jurisdictions was to provide a wide range of generally positive experience concerning the implementation of fare integration in large metropolitan regions in other parts of the world.

London, England

Two carriers, London Transport and British Rail, provide the public transit service in this urban region of 6.7 million. London Transport operates under the political jurisdiction of the Greater London

Council (although this jurisdiction is expected to change in 1985), and serves the City of London as well as 32 incorporated boroughs.

Despite the fact that the vast majority of the public transit services have been under the control of a single operator (London Transport) for decades, the bus and underground services were operated with different fare structures which did not provide for intermodal transferring without payment of a full second fare.

In May, 1983 the most radical adjustment in fares in the history of London Transport was implemented. This involved modifying the bus fare structure from a "stage fare" system (where the fare was computed on the basis of 0.6 to 0.8 km distance increments or "stages"), and the underground fare from a distance basis (where the fare between stations was computed on a distance formula), to a course radial zone system comprising three zones for the bus system and five zones for the underground system, centred on the City of London. A Travelcard (period pass), available in weekly, monthly, quarterly and annual denominations, and providing for unlimited riding during the period of validity, was introduced at the same time.

London Transport considers that this first step in implementing full fare integration has been a success. The objectives of introducing a simpler fare structure, which provides for convenient intermodal transfers and which encourages the use of the underground over bus travel to Central London, has been achieved. Increased efficiency through reduced fare administration costs, the opportunity to move to one man bus operations, and reduced fraud are also claimed as benefits of the new fare system.

Tyne & Wear, England

The Metropolitan Region of Tyne & Wear contains a population of 1.1 million and is located in the northeast of the country. This jurisdiction has implemented the first fully integrated fare system in Britain.

The Tyne & Wear Passenger Transport Executive (PTE) is one of several agencies set up in Britain to assume full responsibility for the planning, administration and operation of public transportation in urban regions. It operates both bus and light rail services and contracts for bus and rail services from bus companies and British Rail, respectively.

The introduction of the new light rail system (Metro) was the catalyst that brought about the rationalization and integration of the fare structure in the region. Fare integration was implemented within specified revenue targets, since the Central Government indicated that its operating subsidies following the opening of the Metro would be fixed with no annual non-inflationary increases.

A hexagonal or honeycomb zone system was set up with each zone being approximately 5 km across. This fare structure accommodated travel within these zones and between zones either with transferring or no-transferring privileges. Period passes or "Traveltickets" were issued at the same time in weekly, four weekly and annual denominations.

Despite an average fare increase of 30% at the time of implementation, ridership has grown steadily, due in part to the implementation of the Metro service, but also as a result of the attractiveness and simplicity of the new fare structure.

The Netherlands

The experience in the Netherlands represents the most radical fare integration experiment in the world, with the entire country of 13.5 million included within the same fare integration system covering both urban and intercity public transit services.

The initial efforts of the Central Government were to rationalize and integrate a large number of suburban and urban carriers operating through and outside the major cities. While this initial step resulted in more efficient service, there were a variety of different ticketing systems and fare structures, which created great confusion for the operators and the passengers.

The next step in the process was to rationalize the fare structure in a way which would greatly simplify the existing arrangements and would increase the flexibility of use by passengers, such that tickets purchased in one area of the country could be used directly in another area.

The result was that the entire country was subdivided into a zone structure, with zone dimensions of approximately 4 to 4 1/2 km. The entire system comprises 2,800 zones throughout the country. Off-vehicle fare purchases are encouraged by a fare structure which penalizes on-vehicle purchases. The principal fare medium is a Strippenkaart, or multi-ride ticket, with each strip on the ticket valued at one zone of travel. Weekly, monthly and annual period passes are also available, but these are less flexible than the Strippenkaart, since they are for travel within a specified area, according to the number of zones of travel which have been purchased.

While this initial system has been readily accepted by passengers, there is a lack of data on ridership information and the subsidy program does not encourage operator efficiency. Therefore, a development program is underway which will replace the Strippenkaart with a form of stored value magnetic ticket. In addition, more responsibility for efficient operation is going to be passed back to the carriers from the Central Government.

Rhine Ruhr, Germany

The Rhine Ruhr of West Germany contains 23 municipalities encompassing a population of 8 million, comprising the largest fare integration system implemented to date in Germany.

Construction of a rail rapid transit network linking the main centres of this multi-centred region, a wide variety of fare structures and fare media, and the inability for passengers to conveniently transfer between carriers, were the primary reasons for implementing the fare integration system in the Rhine Ruhr Region.

The fare system rationalization was built around a hexagonal or honeycomb zone system, with a zone size of 6 to 7 km. Single and multi-ride tickets, and weekly and monthly period passes are available for multi-zone trips including free transfers between carriers.

Fare revenues are collected by individual carriers and are reported to a central agency which reimburses each carrier for the difference between their revenue and costs, with the costs calculated on a standard formula that takes into account the type of service being provided.

Munich, Germany

Unlike the Rhine Ruhr multi-centred region, the Munich region is centred on the City of Munich. The population of 2.3 million is distributed amongst the City of Munich and 170 smaller towns and cities. The Munich Municipal Transit Authority, the German Federal Railways and 40 private bus systems under contract to the smaller towns and cities provide the public transit services in this region.

The fare structure is based on concentric zones with the City of Munich at the centre. Multi-ride strip tickets, similar to those used in the Netherlands, are available in addition to single ride fares. Weekly and monthly period passes are also available.

Fare revenue accrues to a central agency and is distributed to the operating partners based on a formula which takes into account the amount and type of service provided.

Subsequent to implementation of the integration measures, significant improvements in financial performance, productivity and ridership have been achieved.

Paris, France

Transit service in this 4,000 sq. km. region containing 9.5 million population is provided by the Paris Region Transit Agency (RATP), the French National Railway, and an association of private bus operators.

The main instrument of fare integration in the Paris region has been the "Carte Orange", a period pass providing unlimited travel within a five zone radial structure, with the City of Paris as the central zone. The very substantial discounts offered for the Carte Orange have attracted its use by 60% of all public transit trips in the region.

The passenger fare revenue loss resulting from the Carte Orange program has been made up by an Employment Tax (2% in Paris and 1.2% in the suburban communities).

The Central Government has played a very strong role in the planning, managing and financing of public transit in the Paris region for many years.

Perth, Australia

Public transit services in Perth and the surrounding region are provided by a single carrier which also has the political mandate to implement fare integration. The urban region is centred on the City of Perth and contains a population of approximately 1 million.

The fare structure is based on a radial zone system centred on the City of Perth. Since initial implementation, this zone structure has been refined, so that the individual radial zones are now approximately 7 km in width. Fare integration was implemented to improve passenger convenience and to provide an equitable fare structure which graduates the fare according to distance travelled.

San Francisco Bay Area

The responsibility for planning, operating and funding public transit in the San Francisco Bay Area is distributed over a large number of agencies and this has hampered attempts to achieve fare integration objectives. Five major bus systems, two commuter rail systems and four small bus systems provide service within the region which contains 4.3 million population.

A variety of different fare structures and fare collection systems are in effect which creates impediments to fare integration on a regional scale. Partly as a result of this, and as well the very significant problem of reaching agreement among all the participating funding, administration and operating agencies, only modest progress has been achieved towards fare integration. Two carriers have a joint monthly pass at a small reduction over the cost of the two separate passes. One carrier (MUNI) has underwritten the cost of providing access to the BART system within San Francisco. The most popular pass program to date has been the CalTrain peninsula commuter rail system where for an additional cost of $10/month, local transfers are permitted to and from the CalTrain stations.

San Diego

With a similar political and operating environment to the San Francisco Bay Area, the San Diego region, containing a population of 1.2 million in seven cities and one county, has been success in achieving its initial fare integration goals, encompassing a regional pass and transfer program.

Fixed route bus services are operated on a flat fare cash basis with prices varying according to the type of service provided in three categories: local/feeder service, urban service (short to intermediate distance trips), and metro service (long distance trips). The San Diego trolley (light rail service) is operated on a zone fare structure. Transfers from a higher level of service to a lower level of service (eg. from a metro service to an urban service) are permitted free and in the reverse direction the rider must pay the difference between the two fares. The Regional Ready Pass Program provides unlimited monthly travel among all fixed route bus and light rail services operating within the region.

Principal Results

A number of important findings came out of this survey and these are summarized below.

In virtually all cases, fare and service integration was considered a single package and was carried out together.

The principal objectives which were equally important in implementing fare integration were efficiency and passenger convenience.

There was no evidence that passenger complaints were a factor in motivating the agency involved to carry out these fare and service reforms. Rather, they recognized the need for and opportunity to develop an integrated regional and local public transit system, with service and fare integration the means to this end.

Fare equity emerged as a very important issue in all cases, with fare equity defined as meaning a graduated fare structure approximating the distance travelled and distinguishes between different levels of service. In several cases this fare structure was very finely graduated.

In most cases, the changes in the fare structure and associated fare policies were radical and complex and in some cases they also included a general fare increase. Passengers readily adapted to these changes.

In virtually all cases the results of the initiatives included steady passenger ridership increases, demonstrating that travel mode share can be influenced by service and fare integration measures.

In all cases, the fare and service integration efforts were implemented through a central coordinating agency, with the responsibility and authority of the coordinating agency varying from jurisdiction to jurisdiction. Generally speaking, the level of responsibility and authority of the coordinating agency influenced the scope of the changes.

The results of this survey points out several different models which this region can consider for application to improve fare integration between interfacing local and regional transit carriers.

3. FUTURE PROSPECTS AND ISSUES IN THE TORONTO REGION

Exhibits 3.1 and 3.2 indicate the potential growth in population and employment in the region surrounding Metropolitan Toronto over the period to 2001.

Not only are the surrounding municipalities expected to substantially increase in population, but they are also expected to even more significantly increase their employment base, resulting in higher employment to population ratios in the future than at the present time. This will result in a region which will be increasingly more economically interdependent, with increased commuting from Metro Toronto to the surrounding regions, as well as the reverse. Exhibit 3.2, which shows the projected growth in work trips between Metro suburban municipalities and the adjacent municipalities of Mississauga, South York and Ajax/Pickering, quantitatively illustrate the increased economic inter-dependence that can be expected in the future.

The implication of this trend for transit service is clear: a substantial upgrading of the level of service, integration of transit service across the Metropolitan Toronto boundary, and fare integration, will be required if public transit is to capture a significant share of this future travel. Similar measures will also be required in other parts of the region. For example, improved integration between Hamilton and Burlington, Ajax and Pickering and Oshawa and Whitby would foster equivalent benefits in these municipalities.

Of the 450 million public transit trips provided for annually in this region, approximately 30 million trips now cross the Metro Toronto boundary and a substantial proportion of these involve an intermodal transfer. It would certainly be more convenient for passengers if they were able to pay a single fare for these cross-boundary transfer trips. Most important, however, is the lack of service and fare integration for the shorter cross-boundary trips. Typically only 10% of these trips are carried by public transit, and it is these trips that will have to be much better served in the future. All of the transportation studies undertaken

EXHIBIT 3.1

ESTIMATED POPULATION GROWTH - TORONTO CMA

	POPULATION			EMPLOYMENT			EMPLOYMENT/POPULATION RATIOS		
MUNICIPALITY	1980	2001	% change	1980	2001	% change	1980	2001	% change
Metro	2,092,430	2,215,130	6	1,185,660	1,410,500	19	.57	.64	12
Ajax/Pickering	59,570	108,280	82	17,850	39,800	123	.30	.37	23
South York	210,470	455,500	116	85,050	234,150	174	.40	.51	28
Peel	464,750	864,440	86	207,500	482,980	132	.45	.56	24
Halton	126,890	229,600	81	43,910	92,653	111	.35	.40	14

SOURCE: Metro Toronto Planning Department

EXHIBIT 3.2

GROWTH IN WORK TRIPS

	INBOUND			OUTBOUND		
	1980	2001	% CHANGE	1980	2001	% CHANGE
MISSISSAUGA - ETOBICOKE	20,000	30,000	50	15,000	25,000	60
SOUTH YORK - NORTH YORK	8,000	25,000	200	11,000	25,000	123
AJAX-PICKERING - SCARBOROUGH	1,600	3,700	128	1,400	2,900	109
TOTAL	29,600	58,700	98	27,400	52,900	93

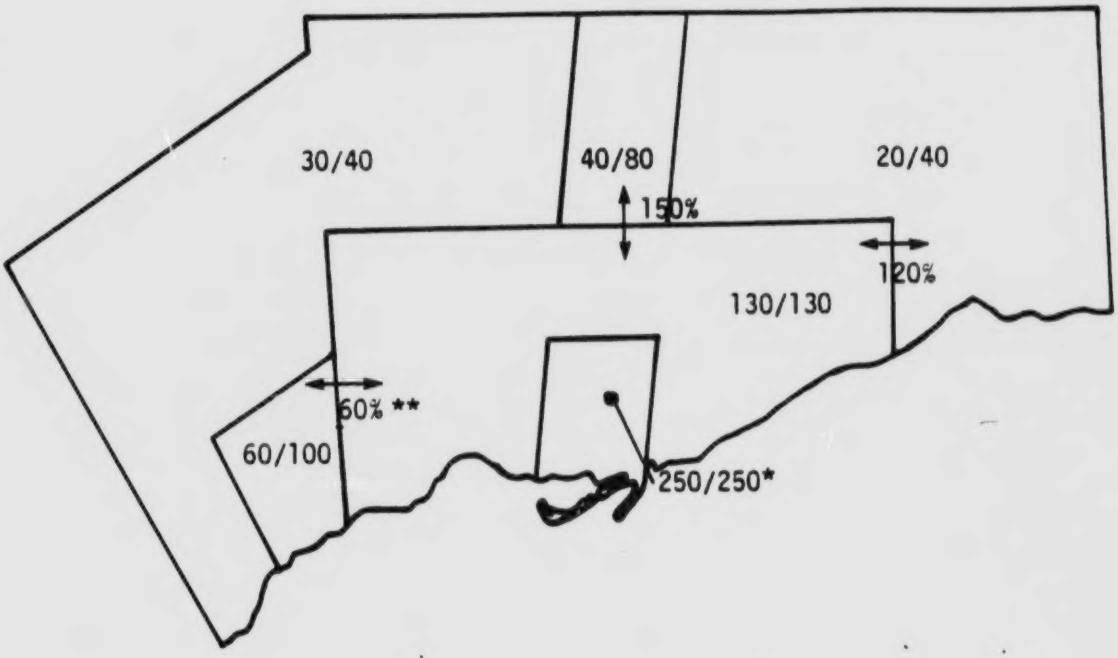
O GROWTH IN TRIPS TO CENTRAL TORONTO SIGNIFICANTLY LESS THAN TO THE SUBURBS to date point out the requirement that public transit must capture a very substantial increase in the total share of these trips, if there is to be a balance between transportation and demand and between transportation demand and supply in the region.

Exhibit 3.3 provides a schematic illustration of this issue, by showing the existing and potential future transit ridership per capita per annum in Metropolitan Toronto, the surrounding suburban municipalities and for trips crossing the Metro boundary. Combining this with the projected growth in work trips in the North Yonge corridor, for example, shows a potential work trip transit ridership increase of five times (doubling of the rides/capita per annum from 40 to 80 times a 2.5 increase in two way work trips).

Thus, there is both an opportunity and a need to more fully integrate the local and regional transit services serving cross-boundary trips. The potential benefits of initiatives taken now to achieve this objective will be as significant to this region as the benefits that have been enjoyed as a result of the other major public transit decisions made in this region over the last 30 years.

EXHIBIT 3.3

POTENTIAL FUTURE GROWTH IN TRANSIT RIDERSHIP 1980 to 2001



30/40
40/80
20/40
150%
120%
130/130
60% **
60/100
250/250*

* 250/250
Rides/capita/annum 1980/2001

** 60% growth in 2-way cross-boundary work trips 1980/2001

o Net cross-boundary transit increase potential of 5 in the Yonge North Corridor